



SIERRA LEONE.

Annual Report

OF THE

LANDS AND FORESTS DEPARTMENT

FOR THE YEAR

1927.

FREETOWN:  
Printed at the Government Printing Office  
SIERRA LEONE

1928







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# Annual Report

OF THE

## LANDS AND FORESTS DEPARTMENT

FOR THE YEAR

1927.

FROM THE COMMISSIONER OF LANDS AND FORESTS

TO THE HONOURABLE THE COLONIAL SECRETARY, FREETOWN.

SIR,

I have the honour to submit herewith the annual report of this department for the year 1927.

2. The department comprises the following divisions :—

- (a) HEADQUARTERS
- (b) DIVISION OF RESEARCH
- (c) DIVISION OF AGRICULTURE
- (d) DIVISION OF FORESTS
- (e) DIVISION OF ENTOMOLOGY
- (f) DIVISION OF INSPECTION.

3. Towards the end of the year it was learnt that the state of Mr. Dawe's health was such as to make it impossible for him to return to West Africa. This loss has caused the keenest regret to all members of the divisions of the department which Mr. Dawe administered and which he had guided so ably and with such self-sacrificing energy since 1922. It is well known to all members of the department that Mr. Dawe's breakdown in health was due to the exhaustion consequent upon so many years of ceaseless toil in the service.

### AGRICULTURAL CONFERENCE, IBADAN.

4. In February, the Commissioner, accompanied by the Agricultural Chemist, Entomologist and Mycologist, attended the first West African Agricultural Conference at Ibadan. Unfortunately, on arrival at Lagos, Mr. Dawe was placed on the sick list and was only able to take a small part in the proceedings of the Conference.

Papers prepared by officers of this department and read at the Conference included —

- |  |  |
|--|--|
| "The Oil-palm and its Products,"   | BY M. T. DAWE, O.B.E., F.L.S. and<br>F. J. MARTIN, M.A., Ph.D., F.I.C. |
| "Soil Survey of Sierra Leone with<br>special reference to a Soil Survey of<br>the British West African Colonies" | BY F. J. MARTIN, AND H. C. DOYNE.                                      |
| "Some Insect Pests of Sierra Leone"  | BY E. HARGREAVES.  |

5. The Commissioner made a tour of the eastern part of the Colony from 7th to 13th June, with the object of collecting information regarding possible sites for an experimental fruit farm, and to investigate the question of how much land exists which is suitable for the development of an export fruit industry. The information collected on this journey has been embodied in his "Report on the Question of Establishing Fruit Growing for Export in Sierra Leone."

6. In August the Commissioner visited Njala and Mabang in order to inspect the activities of the department at these places.

## IMPERIAL INSTITUTE.

7. During the early part of the year arrangements were made with the Director for the rearrangement and improvement of the Sierra Leone Court in the Institute's galleries, for which a special grant of £300 was made from the funds of the Colony. Messrs. Elder Dempster and Company, Limited, African and Eastern Trade Corporation and Paterson, Zochonis and Company, Limited, very generously contributed funds for the construction of dioramas of Freetown Harbour, the piassava industry and the ginger industry, respectively. The dioramas of Freetown Harbour and the piassava industry were in course of construction at the end of the year, and that of the ginger industry will, it is hoped, be completed during 1928.

## BRITISH INDUSTRIES FAIR.

8. Sierra Leone, for the first time, staged an exhibit at the British Industries Fair in London in February and March. Mr. P. Clemens (retired Assistant Colonial Treasurer) was in charge, and this department arranged the collection and shipment of exhibits from Sierra Leone. Mr. Dawe, before leaving England, made arrangements for the display of the exhibits.

## IMPERIAL BUREAU OF MYCOLOGY.

9. This Bureau again rendered invaluable assistance to the Mycologist and the department generally.

## IMPERIAL BUREAU OF ENTOMOLOGY.

10. Both Entomologists of the department have received invaluable assistance from this Bureau throughout the year.

## KEW (BOTANICAL SPECIMENS).

11. The Mycologist made a considerable collection of herbarium specimens, and the Royal Botanic Gardens, Kew, rendered great assistance in determining these.

## TSETSE FLY SURVEY.

12. In September Dr. J. G. H. Frew was appointed by the Colonial Research Committee to conduct an investigation into the distribution of tsetse fly and its bearing on the expansion of cattle raising in the Protectorate. He travelled extensively in the Northern Province and at the end of the year had investigated the area covered by map sheets 39-42 and 52-53 of the Sierra Leone Survey.

The results of his investigations are set out in Section II, Part III, of this Report.

I have the honour to be,

SIR,

Your obedient servant,

KENNETH BURBRIDGE,

*Acting Commissioner of Lands and Forests.*



# APPENDICES.

## A.—FINANCIAL. REVENUE.

	Administration.		Entomology.		Research.		Inspection.		Agriculture.		Forests.		Total.
	£	s. d.	£	s. d.	£	s. d.	£	s. d.	£	s. d.	£	s. d.	£
LICENCES :													
Crown lands	...	...	...	...	...	...	...	...	...	...	...	...	...
Produce	...	...	...	...	...	...	1,335	7 6	...	...	36	4 0	36 4 0
Fines for contravention of Produce Ordinance	...	...	...	...	...	...	136	5 0	...	...	...	...	1,335 7 6
Gum copal	...	...	...	...	...	...	...	...	...	...	77	0 0	136 5 0
Departmental fines	1	1 6	...	...	...	...	...	...	11	11 5	3	3 0	77 0 0
													15 15 11
FEES OF COURT, ETC. :													
Sale of Government stores	11	18 3	...	...	0	7 6	...	...	4	16 0	1	3 2	18 4 11
Sale of produce	...	...	...	...	...	...	...	...	271	2 9	...	...	271 2 9
Sale of rubber	...	...	...	...	...	...	3	3 7	...	...	1,467	14 6	1,467 14 6
Weights and measures	...	...	...	...	...	...	...	...	...	...	...	...	3 3 7
MISCELLANEOUS RECEIPTS :													
Other miscellaneous receipts (Royalties—Colonial Reserve)	...	...	...	...	...	...	...	...	...	...	18	2 0	18 2 0
TOTAL REVENUE	£	12 19 9	...	...	0	7 6	1,474	16 1	287	10 2	1,603	6 8	3,379 0 2

## EXPENDITURE.

	Administration.		Entomology.		Research.		Inspection.		Agriculture.		Forests.		Total.
	£	s. d.	£	s. d.	£	s. d.	£	s. d.	£	s. d.	£	s. d.	£
PERSONAL EMOLUMENTS :													
Salaries	2,703	14 3	1,208	14 8	2,522	12 8	775	3 6	6,519	11 4	6,615	15 4	20,345 11 9
Duty allowance	240	0 0	...	...	72	0 0	...	...	200	0 0	200	0 0	640 0 0
Seniority pay	...	...	48	0 0	...	...	...	...	...	...	17	15 7	137 15 7
Allowance in lieu of quarters	3	1 2	19	8 2	27	19 8	17	10 0	153	15 0	22	12 0	244 6 0
TOTAL PERSONAL EMOLUMENTS	£	2,946 15 5	1,276 2 10	2,622 12 4	792	13 6	6,873	6 4	6,856	2 11	21,367	13 4	21,367 13 4

## EXPENDITURE—continued

	Administration.			Entomology.			Research.			Inspection.			Agriculture.			Foresta.			Total.		
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
OTHER CHARGES :																					
Chemicals and apparatus ...																					
Museum outfit ...	52	...	2 11	74	16	5	308	18	3	...	...	...	...	...	...	...	...	...	383	14	8
Collecting specimens for Imperial Institute, etc. ...				...			...			...	...	...	...	...	...	...	...	...	52	2	11
Handbook of Flora of West Africa ...	20	0	0	...			...			...	...	...	...	...	...	...	...	...	20	0	0
Grant to Imperial Bureau of Mycology ...	136	9	1	...			...			...	...	...	...	...	...	...	...	...	136	9	1
Contribution to Central Forestry Training Institute, London ...	125	0	0	...			...			...	...	...	...	...	...	...	...	...	125	0	0
Imperial Institute, contribution to ...	259	13	6	...			...			...	...	...	...	...	...	...	...	...	259	13	6
Imperial Institute, special grants to ...	1,150	0	0	...			...			...	...	...	...	...	...	...	...	...	1,150	0	0
Scholarships, Imperial College of Agriculture, Trinidad ...	300	0	0	...			...			...	...	...	...	...	...	...	...	...	300	0	0
Contribution to Imperial College of Agriculture, Trinidad ...	520	0	0	...			...			...	...	...	...	...	...	...	...	...	520	0	0
Library ...	250	0	0	...			...			...	...	...	...	...	...	...	...	...	250	0	0
Electric light and gas plant ...	...			18	4	6	98	14	1	...	...	...	30	2	10	8	12	6	155	14	11
Uniform for subordinate staff ...	13	9	8	...			97	11	6	...	...	...	...	...	...	...	...	...	97	11	6
Contingencies ...	80	8	2	0	10	8	12	16	10	42	15	9	31	3	4	186	13	6	287	9	9
Agricultural shows ...	318	19	9	1	18	7	47	13	11	17	14	6	36	19	9	42	3	11	226	18	10
Passages ...	260	9	0	...			...			...	...	...	...	...	...	...	...	...	318	19	9
Railway fares and freight ...	54	5	4	175	18	0	288	1	0	63	12	0	443	5	0	299	10	0	1,530	15	0
Transport (carriers, etc.) ...	51	0	6	66	11	0	105	6	0	103	19	8	930	13	2	429	3	1	1,689	18	3
Travelling allowances ...	19	18	3	27	6	3	71	8	9	149	14	2	973	16	5	281	6	2	1,554	12	3
Transport allowances ...	72	3	7	20	5	6	21	3	3	53	0	6	357	8	4	356	6	0	808	1	10
Telephone service ...	78	11	4	30	16	5	46	9	5	...	...	...	137	14	9	124	10	7	411	14	9
Tsetse fly survey ...	...			...			...			...	...	...	34	11	3	...	...	...	113	2	7
Report on products, publication of ...	43	15	3	361	17	5	...			...	...	...	...	...	...	...	...	...	361	17	5
Agricultural development ...	...			...			...			...	...	...	...	...	...	...	...	...	43	15	3
Labour and native assistants ...	...			...			...			...	...	...	321	18	0	...	...	...	321	18	0
Rubber tapping, Kenena Plantation ...	...			...			...			...	...	...	4,057	11	2	...	...	...	5,075	17	6
Tools, appliances and materials ...	...			...			...			...	...	...	...	...	...	1,018	6	4	984	12	5
Seeds and plants, distribution of ...	...			...			...			...	...	...	248	...	...	59	18	3	308	14	6
Other Charges—carried forward	£			...			...			...	...	...	86	13	8	...	...	...	86	13	8



## EXPENDITURE—continued.

	Administration.			Entomology.			Research.			Inspection.			Agriculture.			Forests.			Total.			
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	
OTHER CHARGES— <i>brought forward</i>																						
Seeds and plants, purchase of	...	...	...	...	...	...	...	...	...	...	...	...	169	13	11	...	5	7	169	19	6	
Laboratory appliances	...	...	...	...	...	...	...	...	...	...	...	...	124	3	1	...	...	...	124	3	1	
Survey instruments	...	...	...	...	...	...	...	...	...	...	...	...	23	6	1	54	9	3	77	15	4	
Cotton ginnery, expenses <i>pro</i>	...	...	...	...	...	...	...	...	...	...	...	...	14	2	8	...	...	...	14	2	8	
Books, stationery, etc.	...	...	...	...	...	...	...	...	...	...	...	...	20	18	5	7	0	0	20	18	5	
Rent of experimental stations, etc.	...	...	...	...	...	...	...	...	...	...	...	...	29	0	0	...	...	...	36	0	0	
Tents and camp equipment	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	28	8	1	28	8	1	
Allowance for Continental tour	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	52	8	7	52	8	7	
TOTAL OTHER CHARGES	£	3,806	6	4	778	4	9	1,098	3	0	430	16	7	8,071	19	1	3,913	14	3	18,099	4	0
TOTAL PERSONAL EMOLUMENTS	£	2,947	5	3	1,276	2	10	2,622	12	4	792	13	6	6,873	6	4	6,855	12	11	21,367	13	4
GRAND TOTAL	£	6,753	11	9	2,054	7	7	3,720	15	4	1,223	10	1	14,945	5	5	10,769	7	2	39,466	17	4

## PART II.

## DIVISION OF RESEARCH SECTION.

13th March, 1928.

TO THE HONOURABLE THE COMMISSIONER OF LANDS AND FORESTS.

I have the honour to submit herewith my report for the year 1927, and attach that of the Mycologist.

2. *Museum*.—The departmental museum continues to evoke much interest among inhabitants of Freetown and visitors to the Colony. The economic exhibits have been augmented during the year and samples of produce from other colonies as well as from Sierra Leone are displayed, while there is also an exhibit of insects, beneficial and harmful, to agricultural crops in the Colony. 5,318 visits were made to the museum during the year.

## CHEMICAL SECTION.

3. The work of the chemical section during the year was concentrated mainly on work connected with soils, oil-palms and piassava. 339 samples in all were received and these are summarized as follows:—

## SOILS :

Northern Province	...	...	...	25
Central Province	...	...	...	102
Southern Province	...	...	...	22
Colony	...	...	...	95
French Guinea	...	...	...	5
England	...	...	...	2
				<hr/> 251

## OIL-PALM PRODUCE.

Fruits	...	...	...	...	26		
Kernels	...	...	...	...	2		
Oil	...	...	...	...	13		
					<hr/>	41	
Coco-nuts	...	...	...	...	...	4	
Pathological	...	...	...	...	...	5	
Water, foods and drugs		...	...	...	...	23	
Miscellaneous	...	...	...	...	...	15	
						<hr/>	339

4. It will be seen that no samples of piassava are included in the above list owing to the fact that no analyses of the fibre are made, the quality of the fibre being judged by appearance, cleanliness and toughness. The work on piassava will be described in a later paragraph.

5. *Soils*.—During the year 251 samples of soil were submitted for examination. These included five samples from French Guinea and two from England. This shows a falling-off in numbers from last year, due to the fact that having gained a fairly comprehensive idea of the distribution of soil types over those parts of the Colony and Protectorate frequently visited by officers of this department, it has become increasingly more important to study these more intensively.

6. The following tables give the figures obtained by our ordinary routine analyses of soils, and the samples are grouped in accordance with the provinces in which they occur.



# NORTHERN PROVINCE SOILS.

## SUMMARY—(25 SOILS).

Sample Numbers.	District.	Chieftdom.	Town.	Type.	STONES.		Sand.		Silt and Clay.		pH.		Lime Requirement.		Organic Matter.	
					Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
2150 to 2157	Bombali	Bombali IV	Makump	Sandy loam ...	Nil	Nil	76.0	47.4	52.6	24.0	6.2	5.6	.38	.26	...	...
2171 " 2178	Koinadugu	Sambaia	Bendugu	Gravelly ...	91.8	8.3	85.4	67.2	32.8	14.6	5.3	4.2	.44	.26	4.3	1.6
2230 " 2231	Port Loko	Sarcies area	Rotombo	Swamp ...	1.8	Nil	49.6	47.2	52.8	50.4	5.1	4.8	.58	.56	10.3	6.3
2232 " 2234	"	"	Gbinti	" ...	.8	Nil	85.8	77.2	22.8	14.2	5.2	3.9	.22	...	3.3	2.4
2235 " 2236	"	"	Katema	" ...	2.7	Nil	46.2	35.8	64.2	53.8	5.8	5.1	.4	.22	3.2	2.7
2237 " 2238	"	"	Kagbangwa	" ...	3.2	1.5	42.8	40.8	59.2	57.2	4.2	3.9	.82	.48	12.8	3.5

# CENTRAL PROVINCE SOILS.

## SUMMARY—(44 SOILS).

Sample Numbers.	District.	Chieftdom.	Town.	Type.	STONES.		Sand.		Silt and Clay.		pH.		Lime Requirement.		Organic Matter.	
					Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
2185 to 2228	Moyamba	Dasse	Njala	Sandy ...	4.2	Nil	90.8	71.6	28.4	9.2	6.5	3.3	.26	.12	2.3	.9

# SOUTHERN PROVINCE SOILS.

## SUMMARY—(6 SOILS).

Sample Numbers.	District.	Chieftdom.	Town.	Type.	STONES.		Sand.		Silt and Clay.		pH.		Lime Requirement.		Organic Matter.	
					Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
2288 to 2289	Pujehun	Kpaka	Sumbaya	Swamp ...	Nil	Nil	13.8	10.0	30.0	86.2	4.8	...	.54	.48	9.1	4.3
2290 " 2291	"	"	Bundoko	" ...	Nil	Nil	43.6	20.8	79.2	56.4	4.8	4.7	.78	.58	17.8	6.5
2292 " 2293	Mano River	Soro	Whedero	Sandy ...	11.1	3.9	63.6	62.6	37.4	36.4	4.5	4.3	.40	.32	4.1	2.3

# COLONY SOILS. SUMMARY—(100 SOILS).

Sample Numbers.	Locality.	Type.	STONES.		Sand.	Silt and Clay.		pH.		Lime Requirement.		Organic Matter.	
			Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
802 to 809	Lumley ...	Gravelly	82.5	37.5	83.4	58.4	41.2	16.6	—	—	3	23	—
810 " 813	" ...	Sandy	0.9	Nil	99.6	98.6	1.4	0.4	—	—	—	—	—
814 " 817	Cape ...	Gravelly	71.6	35.8	65.8	58.0	42.0	34.2	—	—	38	34	—
2159 " 2170	Hastings ...	"	56.8	4.6	65.4	44.2	55.8	34.6	7.0	5.1	34	22	3.5
2130 " 2133	Waterloo ...	Sandy loam	12.0	Nil	66.6	37.8	62.2	33.4	6.0	4.3	36	34	4.3
2078 " 2081													
2086 " 2089													
2102 " 2105													
2142 " 2145	" ...	Sandy	4.8	Nil	84.4	80.2	19.8	15.6	5.2	4.8	18	16	2.8
2082 " 2085	" ...	Sandy over-lying gravel	79.7	Nil	66.0	41.2	58.8	34.0	6.5	5.1	38	24	4.5
2090 " 2101													
2126 " 2129													
2106 " 2125	" ...	Gravelly	88.7	31.6	72.8	46.8	53.2	27.2	7.8	5.0	42	18	6.2
2134 " 2141													
2146 " 2149													

# FRENCH GUINEA SOILS. SUMMARY—(5 SOILS).

Sample Numbers.	Town.	Type.	STONES.		Sand.	Silt and Clay.		pH.		Lime Requirement.		Organic Matter.	
			Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
2241 to 2245	Kindia (Banana Plantation)	Sandy.	5.8	2.1	94.0	77.4	22.6	6.0	6.3	5.0	22	08	2.6
													.7



7. *Special Soil Investigations.*—Research work on the composition of laterite and the lateritic soils in Sierra Leone has been in progress since 1925, but it was only in 1927 that the results reached a point when they might profitably be written up and published. One of the great difficulties encountered was that of a definition of laterite soil. The definitions of Fermor and Shantz and Marbut were found to be unsuitable in that they defined laterite from the point of view of the geologist rather than the soil chemist, and it was found that whereas the small concretions or rocks found in the soil approximated to Fermor's definition, the "fine earth" which is the agriculturally active constituent of soil, did not.

8. The results of these researches were published in a paper entitled "Laterite and Lateritic Soils of Sierra Leone" by F. J. Martin and H. C. Doyne—"Journal of Agricultural Science," Vol. XVII, page 530) and the following is a summary of that paper.

- I. The composition of the clay fractions of various Sierra Leone soils was given.
- II. The formation of laterite from the original norite was followed out and analyses given of the original and final products.
- III. It was suggested that the present definitions as given by Fermor and accepted by Shantz and Marbut were not suitable from the point of view of the agricultural chemist and that the classification of lateritic soils should be based on a chemical analysis of the clay fraction.
- IV. It was further suggested that where the silica/alumina ratio (molecular) of the clay fraction fell below 1.33 the soil should be regarded as laterite, that where this ratio exceeded 1.33 but was less than 2.0 the soils should be regarded as lateritic; where the silica/alumina ratio of the clay fraction is greater than 2.0 the soil should not be described by any term denoting an excess of aluminium.

9. *Combined Water in Soil Fractions.*—It was found by comparing the losses on ignition of soils examined in Sierra Leone with those examined in the Sudan that there were considerable differences in the losses, other than humus, experienced on igniting clay fractions. An examination was made into this point and a paper—"Losses Involved by Igniting Soil Fractions during the Mechanical Analysis of Soils," by F. J. Martin—was published in "Journal of Agricultural Science" (Vol. XVIII, Part I). A summary of this paper is as follows:—

- I. Examinations have been made into the losses involved by igniting fractions of tropical soils.
- II. It has been found that these losses are due partly to organic matter and partly to combined water; the greater part of the loss in lateritic soils is due to water.
- III. In the clay fraction there is a correlation between the amount of combined water and the silica/alumina ratio; the greater the ratio the less the combined water. This is affected by the proportion of iron present.
- IV. Lateritic soils lose more water on ignition than other soils, but the lateritic material in soils is not necessarily evenly distributed throughout the fractions; those fractions containing the highest proportion of laterite lose the most water.

10. *Other Soil Publications.*—Apart from the two publications mentioned above, two other soil papers have been published. The first paper "Soil Investigations in Sierra Leone with Special Reference to a Soil Survey of British West Africa," by F. J. Martin and H. C. Doyne, was read at the West African Agricultural Conference at Ibadan, Nigeria, and published in the Report of the Proceedings of this Conference.

11. The paper described the work already done in Sierra Leone, advocated uniform methods of sampling and analysis on the West Coast and recommended that with these methods as a basis, a soil survey of British West Africa should be undertaken by the Agricultural Chemists in the respective colonies, assisted by agricultural officers who should submit soil samples and agricultural data. Methods of sampling and analysis were put forward to form a basis of discussion, and as a result provisional recommendations were put forward by the Chemical Committee of the Conference and embodied in a report drawn up by the writer on the instructions of the Committee. This report is published on pages 172 *et seq.* of the proceedings of the Conference.

12. The other paper, published in "Tropical Agriculture," was an article on "Soils of Tropical Africa" by F. J. Martin. In this paper a comparison was made between the soils of humid tropical countries like Sierra Leone and dry tropical countries like the Sudan. Attention was drawn to the few records available for tropical African soils and the difficulty of comparing results owing to different methods of sampling and analysis. Uniform methods of sampling and analysis were recommended for adoption both in Africa and other British Tropical Possessions so that the accumulation of the results of soil investigations in the various colonies should in time resolve itself into a soil survey of the British Empire.

13. *Plant Food in Sierra Leone Soils.*—Very little is known as to the supply of plant foods in lateritic soils. In Sierra Leone we have just started an enquiry into the amount of potash, phosphorus and calcium contained in our soils. In the lateritic and laterite soils near the coast the potash and phosphorus content (HCl soluble) of the few soils examined is low and the exchangeable calcium in these soils is also low. In one of the soils of the interior, the Kono grit, a substantial amount of both phosphorus and potash was found. It must however be pointed out that the coarse and fine sand fraction in this grit soil was composed of minute fragments of partially decomposed rock rather than quartz grains, and it is possible that the phosphorus and potash are derived from the coarser fractions rather than from the clay, which is lateritic.

14. *Swamp Soils.*—A rather curious feature of a daily inundated marine swamp was pointed out in a previous report (1925). This swamp contained practically no humus in the soil in the first foot, but accumulations of humus in the second and especially the third foot. In the seasonally inundated rice swamps of the Scarcies area another interesting phenomenon was noticed. The humus was greatest in the first foot, but the proportion of humus to organic matter varied very considerably. In the samples examined the humus varied from 10 to 40 per cent. of the total organic matter and the organic matter varied from 2.8 to 12.8 per cent. of the soil. No means yet exist of obtaining reliable yields from rice farms in the Scarcies area, so that any attempt to correlate chemical data with agricultural possibilities must wait until further additions to the staff in the agricultural department make this possible.

15. *Oil-palms.*—The work on oil-palms is carried out in collaboration with the Mycologist. A separate report is being prepared on the yields to date of the Nigerian oil-palm plantation at Njala, but a summary of these results is given here. The yield of the whole area of the Nigerian oil-palm plantation during 1927 worked out at 23 cwt. of clean fruits per acre as compared with nearly 16 cwt. last year. The yield of oil varied from 20 to 45 per cent. of the fruit, the thinned shelled varieties having the greater proportion of oil. Some trees have high yields of good quality fruit and these have been marked down as suitable parent trees for future breeding experiments.

16. It will be seen by referring to the Mycologist's report that the yield of fruit per acre at 75 trees per acre (the number actually present in the plantation) works out as follows:—

Thick-shelled type	...	...	...	2.994 lb. fruit per acre
Thin-shelled type	...	...	...	2.495 " "

17. Examination of these fruits in the laboratory showed that the thick-shelled fruit contained 24.9 per cent. of oil on the average and the thin-shelled fruit 36.3 per cent. of oil. Assuming 100 per cent. extraction, the yields of oil and kernels per acre are—

		Yield Pericarp Oil per Acre (lb.).	Yield Kernels per Acre (lb.).
Thick shelled type	...	745	257
Thin shelled type	...	905	204

18. These are high yields, especially in the case of the thin shelled variety, and these figures compare very favourably with the average yields from Sumatran estates given by Messrs. Auchinleck and Waters at the West African Agricultural Conference (Proceedings of the first West African Agricultural Conference, 1927, Nigerian Government, Lagos, p. 31).

19. A paper on "The Oil-palm Industry and Its Problems in Sierra Leone," by M. T. Dawe and F. J. Martin, was read at the West African Agricultural Conference at Ibadan, Nigeria. The paper gave a survey of the world's supply of palm oil and palm kernels and the position occupied by Sierra Leone with respect to oil-palm produce. The extent to which Sierra Leone is dependent on palm kernels was demonstrated, and it was further shown that, whereas



Sierra Leone might have little to fear from Sumatran palm oil—since her own exports of that commodity were so small—yet the increasing production of copra in the East Indies—especially in Malaya—is a distinct menace to the future of the kernel industry. The oils from copra and kernels are somewhat similar, and are often interchangeable in manufacturing process: the need of markets to consume the increasing supplies of both copra and kernels was therefore emphasized. The oil-palm work in Sierra Leone was briefly reviewed and it was shown that from the results obtained from the Nigerian oil-palm plantation at Njala, there was every reason to suppose that we could grow oil-palm plantations with heavy yields in Sierra Leone. Some of the heavier bearing palms in the plantation were suitable parent trees from which to breed. Mr. Deighton the Mycologist estimated a heavier yield for 1927 than 1926, and this was amply justified by the results given in paragraph 17 above.

20. It is of interest to note that Bulletin No. 1—"The Palm Kernel Industry in Sierra Leone" by F. J. Martin—which was mentioned in last year's report, has been translated into French and distributed among the French West African colonies under the name "Un Rapport interessant sur les Palmistes de Sierra Leone."

21. *Piassava*.—During the year further investigations were made into the piassava industry. Conferences were held at Freetown, Sulima and Bonthe, so that all the merchants connected with the industry had an opportunity of expressing their views on the type of fibre required. There is of course no chemical test for quality of fibre and this is judged by its pliability, toughness, cleanliness and colour.

22. In August the Agricultural Chemist made a tour of the piassava producing areas in order to inspect the methods used by the natives in extracting fibre, and the way in which piassava is collected, baled and exported by firms dealing in this commodity. A pamphlet on "The Piassava Industry in Sierra Leone" was prepared and has been submitted for publication. The pamphlet describes the production of piassava from the swamp to the final baled product, and photographs are given illustrating the various essential details in the preparation of the fibre. A summary of the paper is as follows:—

- I. The piassava industry in Sierra Leone can be roughly divided into two areas :
  - (a) That east of the Wanje producing the poor quality piassava. This area includes the Mabessi and Kasse areas.
  - (b) That west of the Wanje producing the better quality piassava : this area includes the Kwarko and Nongoba Bullom districts.
- II. The piassava from the east of the Wanje is mainly exported through Sulima and Mano Salija, while that from Kwarko and Nongoba Bullom is all exported through Bonthe. Some of the fibre from the east of the Wanje is brought at Mopalma and Mano Bunjema and shipped through Bonthe : this is the Sherbro No. 2 quality.
- III. The piassava from Mabessi and Kasse is of poor quality because the natives cut immature palms for fibre and do not leave the fibre for sufficient time in the water to "ret"—that is, to rot—the pith so that it can easily be cleaned off from the fibre. The natives in the Kwarko and Bullom areas cut more mature leaves and ret the material in water for a longer time.
- IV. It was recommended that the following points should be observed in the preparation of piassava :—
  - (a) Only mature leaf stalks should be cut.
  - (b) These stalks should be cut off as low down on the trunk of the palm as possible, as the fibre from the lowest part of the leaf stalk is the toughest.
  - (c) The length of the leaf stalk to be cut off for retting is about 3 feet 6 inches, longer stems include a high proportion of strawlike endings to the upper ends of the fibre.
  - (d) The leaf stalks should be split into strips tied into bundles and retted (soaked in water) for two months.
  - (e) At the end of this time the strips should be taken from the water, beaten with wooden sticks and cleaned by drawing the fibre through heckles made of pointed sticks.
  - (f) The fibre should be dried in the shade and must be dried thoroughly.
  - (g) All strawlike fibres should be picked out.
  - (h) The fibre should be tied up into small "hands" and these again into bundles of about 56 lb. It was recommended that piassava for export should be brought under the Native Produce Ordinance.

23. *Copra*.—Samples of coco-nuts from Mobé from the two trees known locally as Nyenni and Hendoï were examined. A higher yield of oil was obtained from these samples than from samples of reputedly the same type examined last year. The copra produced gave the following results :—

Name.	Sample Number.	Moisture.	Oil.
Nyenni	2281	4·4 per cent.	63·3 per cent.
Hendoï	2282	4·0 per cent.	65·1 per cent.

24. *Sugar From Mayingying*.—A tuberous root known locally as Mayingying was examined as a source of sugar. On analysis the following figures were obtained :—

Water	...	...	...	66·6 per cent.
Cane sugar	...	...	...	4·8 per cent.
Reducing sugars	...	...	...	20·8 per cent.

25. This root is sometimes used locally as a source of sugar and, as will be seen from the analysis, it contains a large amount of sugar, of which the greater proportion is reducing sugar. The plant is now being grown at the Experimental Farm, Njala, to test it for yield and sugar content under cultivation. Herbarium specimens of the plant were referred to Kew and determined by Mr. Hutchinson as *Dissotis grandiflora*, Benth. The root appears to be the same as "Djendjeng," of which a sample had already been collected and sent to the Museum at Kew by Scott Elliott and reported by him (*Col. Report Misc. No. 3 1893*, p. 4) to "contain a large amount of sugar and used for wine."

26. *Waters and Water Supply*.—In addition to the ordinary analyses of water sometimes made on behalf of the Public Health Engineer, investigations were carried out on the pipes of the water supply both at Freetown and Waterloo.

27. At Freetown certain of the large steel mains were found to be highly corroded and the corrosion was found to be proceeding from the exterior to the interior of the pipes. Examination of the pipes showed that the greatest amount of corrosion was taking place along the Congo Road areas and the soil in this area was found to be more acid and to contain more humus than the soil along other areas through which the pipe passed. The corrosion in the pipes was often most marked in certain localized areas and "pits" were formed in the pipe. It is thought that the corrosion started at places where the iron of the pipes had been exposed by the scratching off of the anti-corrosive paint during the transit and laying of the pipes, and it was recommended that they should receive a coating of anti-corrosive paint after they had been placed in position. Good results were reported by the Waterworks Engineer (Mr. Cole) from wrapping the pipes in cheap jute cloth and painting with tar. The cost of the anti-corrosive treatment is very small compared with the cost of the pipes. The inside of the large iron and steel pipes are coated with anti-corrosive paint (Dr. Angus Smith's solution) and are in good condition.

28. The small bore pipes used in the house to house distribution system are of galvanized iron, and the Waterworks Engineer reported that these corroded quickly, both from the outside and from the inside; he gave the average length of life of the pipes as about five years. The Freetown water is slightly acid in reaction and was found to dissolve zinc so that galvanizing is not an adequate protection for the iron of the pipes. It was suggested that either pipes of other material should be used, or the pipes dipped in anti-corrosive solution, or the water treated with sodium carbonate or sodium silicate at the distributing tanks at Tower Hill.

29. The water supply to the District Commissioner's bungalow at Waterloo is of a similar nature to the Freetown water supply and the same problem has arisen there.

30. *Analytical Work other than that of an Agricultural Nature*.—Some thirty-five samples of various material have been submitted for analyses or identification in the laboratory. These included samples from a human interior in a supposed poison case, propyl hydrate in scent, burning oil, mineral ores, samples of drugs suspected of containing cannabis indica, waters, scale from water-pipes, several samples of vermouth and a reputedly obscure poison which turned out to be Epsom salts.

31. The analyses of various brands of vermouth were undertaken in view of the alleged deleterious properties ascribed to a vermouth sold locally as "horse kick me," an allusion to its extreme potency. This brand was given great prominence in the local press, and as a result was discreetly withdrawn from the market, no sample of this particular brand being submitted by the police authorities for analysis. The examination of the various other brands



submitted showed that the alcoholic content of the vermouths varied considerably, from 11·6 to 22·3 per cent. of alcohol by volume, while one brand which was sold by a number of different vendors under the same name and label, showed an alcoholic content varying from 17·0 to 11·6 according to the amount of water the vendor thought he could add and still sell his vermouth. Colouring matter of unknown origin was added to the diluted vermouths to preserve an approximation to the colour of the undiluted drink.

32. The following is a list of papers published by the Division of Research during the year :—

1. "The Oil-palm Industry and its Problems in Sierra Leone" by M. T. Dawe and F. J. Martin—(1927) Report of the First West African Agricultural Conference, Nigeria, p. 5.
2. "Soil Investigations in Sierra Leone with a Special Reference to a Soil Survey of British West Africa," by F. J. Martin and H. C. Doyne—(1927) Report of the First West African Agricultural Conference, Nigeria, p. 172.
3. "Soils of Tropical Africa," by F. J. Martin—*Tropical Agriculture*, 1927, Vol. 4, p. 165, reprinted as Bulletin No. 2 of the Lands and Forests Department.
4. "Laterite and Lateritic Soils of Sierra Leone" by F. J. Martin and H. C. Doyne—*Journal of Agricultural Science*, 1927, Vol. XVII, p. 530. Reprints issued as Bulletin No. 3 of the Lands and Forests Department.

F. J. MARTIN,  
*Agricultural Chemist.*

LANDS AND FORESTS DEPARTMENT,  
FREETOWN.

### MYCOLOGICAL SECTION.

The Mycologist's headquarters were transferred from Freetown to Njala on 7th January in order that he might undertake botanical investigations on the oil-palm plots at the Experimental Farm. From the end of February to the end of March he was away from Njala in order to attend the West African Agricultural Conference held at Ibadan, Nigeria. A fortnight was spent in the Gold Coast, where much very useful knowledge was obtained on cacao and oil-palms. A week was then spent in Freetown in an investigation of diseases of garden crops, and it is hoped that a pamphlet on this subject will shortly be issued.

2. The Mycologist proceeded on leave on 17th August and returned to Sierra Leone on 10th December. The last week of the year was spent on trek in the Scarcies area of the Northern Province.

3. In view of the fact that the Mycologist was engaged on oil-palm investigations at Njala, only such mycological work could be done as opportunity and time permitted, and this consisted of a continuation of the general survey of plant diseases in the country, which was started in 1926.

4. Great thanks are due to the Imperial Bureau of Mycology who, as usual, have been helpful with advice and have kindly identified a large number of specimens, chiefly of Polypores, which were sent during the year.

#### (a) *Mycological Investigations.*

The parasites are arranged under their respective host plants.

#### AVOCADO.

5. A black spot, which agrees with symptoms of the disease caused by *Colletotrichum*, is common both on the fruits and on the young shoots. The old trees at Njala are badly affected, but young trees which have been regularly sprayed with Bordeaux Mixture are free from infection.

## BANANA.

6. The Lacatan variety of banana, which it was hoped was immune to Panama Disease, has proved to be susceptible. In the plot of this variety on the Experimental Farm at Njala a third of the plants showed the characteristic symptoms of the disease this year.

## BEANS.

7. There were great losses this year of French beans in gardens. The plants were affected when only 6 inches or a foot high, and in some cases all the beans in a large bed would be affected at about the same time and would be dead or nearly so after a few weeks. The leaves shrivelled and fell off. Large cankers were present in many cases at the base of the stem. The cause of this disease is uncertain. *Rhizoctonia* was common on the leaves, and may have been at least in part responsible for the damage. A *Cercospora* was also common, causing grey-brown spots on the leaves, leaf-stalks and stems.

BUSH GREENS (*Amaranthus caudatus* L.).

8. A few specimens of this plant, which is commonly cultivated as a spinach, were found in a garden at Njala to have some of the leaves attacked by *Rhizoctonia*. The plants were grown too close together. This disease is probably not common, but should it ever be found, the affected leaves should be picked off and burnt to prevent the spread of the fungus to others, and the plants should be thinned out.

## BULRUSH MILLET.

9. The fungus *Tolyposporium penicillariae* Bres. is common on bulrush millet in many parts of the country. In some parts of the country, 15 per cent. or more of the grains of the ear are infected, and the natives consider such ears too bad to harvest. A very considerable loss is therefore caused by the disease. The fungus is said to be able to live several years in the soil, and no control measures can be given except that bulrush millet should not be grown again on the same land for a number of years.

## CASSAVA.

10. When this crop was harvested at Njala many of the older roots were found to be covered with conidiophores of *Sphaerostilbe repens* and were partially rotted. It is not known whether this fungus will attack young cassava roots; only old roots were found diseased.

## COCONUTS.

11. "Crown Disease." Several trees on the Kawei and Hanoi plots are affected with a disease which seems to be identical with the "Crown Disease" described from Sumatra and Malaya. The leaves are twisted owing presumably to unequal growth on the two sides, so that they fall over one another and even over the crown. The plant has therefore a contorted appearance. The pinnæ half-way up the rachis are absent, so that while the rachis bears pinnæ at the apex and base, it is bare for some distance about the middle of its length. No cause has been ascribed for this disease in other parts of the world, but it is stated that palms always recover. Nearly all the palms in the plot of Kawei palms (four years old) show signs of the disease, but most appear to be recovering. The affected trees on the plot of Hanoi palms (four years old) are fewer. A few naturally sown palms about six years old, one of which is the Kawei plot, are also affected. In the nursery a few trees have the same complaint, but no set of conditions could be correlated with it.

12. One of the trees in the Nigerian oil-palm plot suffered from a disease of the young leaves, which were rotted about a point half-way up the mid-rib. Some of the slightly older leaves were also affected and the mid-rib broke just below the middle so that the distal portion of the leaf hung down. The "cabbage" was not affected when the tree was examined. A *Thielaviopsis*, probably *T. paradoxa*, was found on the affected leaves and may have been the cause of the disease. Another unidentified fungus was also found forming black sunken spots with a very sharply defined margin on the upper side of one of the leaf bases. The palm was cut down and destroyed as a precautionary measure, and no other instance of the disease has been encountered so far.

## RICE.

13. "Blast." White or very pale brown elongated spots with a narrow dark brown margin appeared on the leaves in large quantity on the young upland rice at Njala in the beginning of June. A *Piricularia* was associated with the spots. The rice appeared to be badly affected on all the plots when it was a foot high, but latter leaves showed less of the disease which, by the end of the month, was of little importance.

14. A similar diseases to the rice blast, and also associated with *Piricularia*, has been found at Njala on the leaves of a common weed grass, *Eleusine indica*.



## DISEASES OF ORNAMENTAL PLANTS—FLAMBOYANTE TREE.

(Poinciana regia).

15. A flamboyante tree suffering from a root disease was seen this year at Hill Station. The roots on one side and the branches on that side were dead.

The fungus has been identified by the Imperial Bureau of Mycology as *Theissenia*. Just under the bark the fungus forms a black layer between the wood and the bark, and as the thick stroma forms, the bark cracks and exposes the fructifications. Yellowish exudations, partly blackened by spores, come from the fructifications. The extension of the fungus up the branches seems to be fairly rapid.

The fungus has been identified by the Imperial Bureau of Mycology as *Theissenia pyrenocrata* (Theiss?) Maubl. It is quite possible that it is the primary cause of the disease of this flamboyante tree. J

## ROSE.

16. The older leaves of some rose trees in Freetown were found to be attacked by *Diplocarpon rosæ* (Lib) Wolz., which formed black patches on the leaves and caused rather premature leaf fall.

## ZINNIAS AND BALSAMS.

17. An *Oidium* was found at Hill Station on these garden plants.

## DISEASE OF WILD PLANTS.

## (a) Trees.

18. *Fomes pachyphloeus* Pat. commonly attacks *Parinarium excelsum*, Sabine, in the Southern Province and seems to be specific to it. *Ganoderma lucidum* (Leyb) Karst. has been found attacking this same tree at Njala.

## (b) Grasses and Sedges.

19. The following fungi have been recorded:—

*Puccinia rufipes* Diet. on *Lalang* (*Imperata arundinacea* Cyrilli) at Njala.

*Epichloe oplismeni* P. Henn. on *Oplismenus hirtellus* Beauv. at Njala.

*Ephelis japonica* P. Henn. on *Digitaria*, probably *D. seminuda* Stapt., and *Paspalum scrobiculatum* Linn. at Njala

*Phyllachora sphaerospora* Pat. on *Pennisetum gracile* Benth., *P. polystachyum* R. and S. and *Paspalum scrobiculatum* Linn. at Freetown.

*Balansia* sp. on *Streptogyne gerontogaea* Hook. f. at Gorahun, Southern Province. This matches *B. andropogonis* Syd. on *Andropogon* sp. (Report of Imperial Bureau of Mycology).

*Cintractia leucoderma* (Berk). P. Henn. on *Rynchospora aurea* Vahl. in various localities.

*Cintractia aricola minor* Clint. on *Mariscus umbellatus* Vahl. at Njala.

## (c) OTHER HERBS.

20. The following have been recorded:—

*Puccinia lateritia* B. and C. on *Spermacoce ramisparsa* Pohl. at various localities.

*Puccinia batatae* Syd. on *Ipomoea digitata*, at Njala.

*Pucciniastrum anthocleista* P. Henn. on *Anthocleista parviflora* Baker, at Njala and Hill Station.

*Aecidium blepharidis* Har. and Pat. on *Blepharis boerhaavifolia* Pers. at Hill Station.

*Cystopus ipomoeae panduratae* (Schw.) Stev. and Swing. on *Ipomoea digitata*, at Njala.

(a) *Records of Other Fungi.*

21. The following fungi have been collected as saprophytes in Sierra Leone:—

*Basidiomycetes:*

*Cyathus limbatus* Tul.  
*Ganoderma subternatum*.  
*Fomes lignosus* (Kl.) Bresad.  
*Fomes hornodermus* Mont.  
*Hexagonia hirta* Palis.  
*Hexagonia discopoda* Pat.  
*Hexagonia dybowskii* Pat.  
*Hirneola auricula-judae* Fr.  
*Irpea flavus* Kl.  
*Lenzites repanda* (Mont.) Fr.  
*Polyporus grammacephalus* Berk. var. *favoloides* P. Henn.  
*Polyporus durus* Jungh.  
*Polyporus pyrophilus* Wakef.  
*Polystictus occidentalis* (Kl.) Fr.  
*Polystictus lichenoides* Mont.  
*Polystictus xanthopus* Fr.  
*Polystictus sanguineus* (Linn.) Menz  
*Polystictus mollerianus* S.B. and R.  
*Polystictus incomptus* Fr.  
*Polystictus hunteri* Lloyd. ?  
*Polystictus tabacinus* Mont.  
*Poria ravenalae* (B. and Br.) Sacc.  
*Schizophyllum commune* Fr.  
*Trametes corrugata* Pers.

*Discomycetes:*

*Cookeina tricholoma* (Mont.) D. Kuntze.

*Pyrenomycetes:*

*Daldinia escholtzii* (Ehrenb.) Rehm. "Te-bubui" (Mende).  
*Daldinia angolensis* (W. and C.) Sacc. on *Eriodendron*.  
*Hypoxyton anthrochroum* B. and B. on *Codiaeum* sp.  
*Hypoxyton haematostroma* Mont.  
*Sarcoxyton aurantiacum* Pat.  
*Xylaria faveolus* Lloyd.  
*Xylaria hoemorrhoidalis* B. and Br.

*Myxomycetes:*

*Arcyria cinerea* Pers. var. *digitata* G. Lister.  
*Fuligo septica* Gmel.  
*Lycogala epidendrum* Fr. var. *exiguum* Lister

(b) *Herbarium.*

22. About 600 specimens were collected in Sierra Leone during the year and added to the departmental herbarium. Duplicates of all the specimens were sent to the Royal Botanic Gardens, Kew, who have kindly identified them. The specimens consisted chiefly of grasses and sedges, and included several new records for Sierra Leone, and a new variety of *Paspalum scrobiculatum*.

## (c) OIL-PALM INVESTIGATIONS.

23. This year the Mycologist took charge of all work in connexion with the oil-palm plots at Njala. During the time he was on leave, the work was handled over to the Provincial Superintendent in charge of Njala.

24. During the year, fruit was harvested for the first time from the plots of "Kawei" and "Henoi" oil-palms, which were planted out in August, 1924, with seedlings about one-and-a-half years old which had developed from sowings in the nursery of naturally occurring fruit of these two native types of palm. The palms in the plots were therefore four to four-and-a-half years old when the first harvest from them was taken.



## NIGERIAN OIL-PALM PLOT.

25. Except for a few palms which were planted later, these palms are now in their seventh year after planting. The yield of fruit is much larger than last year, but the number of heads harvested is smaller.

			Number of Heads Harvested which contained Fruit.	Weight of Heads Harvested.	Weight of Fruit Harvested.
1926	...	...	2,674	10,259 lb.	6,671 lb.
1927	...	...	2,419	17,699 lb.	11,361 lb.

26. The palms of the Nigerian oil-palm plot, which all came from a sample of thin-shelled fruit from Nigeria, have given a great range of types of fruit, comparable with similar plantings in other countries. As so far determined (some palms have not yet borne fruit) the following numbers of the different types are present:—

Thick-shelled	...	...	...	...	...	153
Thin-shelled	...	...	...	...	...	138
Medium shelled	...	...	...	...	...	15
Mantled	...	...	...	...	...	2
Shell-less ( <i>Pisifera</i> type)	...	...	...	...	...	4
Undetermined	...	...	...	...	...	23
Total	...	...	...	...	...	335

27. The average weight of fruit harvested per bearing tree of the two main types for 1926 and 1927 is given below:—

		1926.		1927.	
Thin-shelled type	...	20 lb.	3 oz.	33 lb.	4 oz.
Thick-shelled type	...	33 lb.	9 oz.	39 lb.	15 oz.

The highest yielding trees are of the thick-shelled type, five of which gave over 100 lb. of fruit each this year (the highest yielding tree gave 126 lb.), while the highest tree of the thin-shelled type gave only 94 lb. of fruit.

28. Several sample heads of different types were sent to Freetown during the year, and the fruits were kindly analysed by the Agricultural Chemist.

29. A separate report is being prepared on the data accumulated up to date from the Nigerian oil-palm plantation.

30. It is proposed to commence some breeding and selection work with the ultimate object of producing a good-yielding strain of palm bearing fruit with thick pericarp and thin shell.

31. The oil-palm plots at Njala are too small for extended cultivation experiments, but a trial has been made with certain wild plants as cover crops to prevent soil erosion during the rainy season, to keep out objectionable weeds and to give as little trouble as possible in upkeep. A common grass, *Axonopus compressus*, and a leguminous perennial, *Desmodium adscendens*, are being tried. Both will grow in the shade of an oil-palm plantation as well as in the sun, and they are both low-growing and creeping plants.

F. C. DEIGHTON,  
*Mycologist.*

## PART III.

## REPORT ON THE ENTOMOLOGICAL SECTION.

## SECTION I.

22nd February, 1928.

THE HONOURABLE THE COMMISSIONER OF LANDS AND FORESTS, FREETOWN.

SIR,

I have the honour to submit my report for the year 1927.

2. I was absent from the Colony from 6th July to 12th November, on vacation leave, and also from 26th February to 16th March, attending a conference of Agricultural Research Officers, held at Ibadan, Nigeria.

3. Most of the work during the year has been in connection with coco-nut, ginger and kola.

## COCO-NUT.

4. The coco-nut scale *Aspidiotus destructor*, Sign., has extended somewhat, but in the majority of localities previously infested the palms have recovered and are now bearing well.

5. The natural enemies, *Chilocorus schiodtei* and *C. dohrni* (predaceous ladybird beetles) and *Pseudomicrocera henningsii* (parasitic fungus) have been collected and distributed to various parts of the country.

6. In connection with the fungus, it would appear that for some reason it is difficult to establish in situations alongside the sea although it has made excellent progress at Number Two in the Colony where the scale is now under control.

## GINGER.

7. The scale insect mentioned in the report for 1926 which attacks the rhizomes, proved to be *Aspidiotus hartii*, Ckll.

8. With regard to the experiment in connection with the treatment of ginger infested with this insect, the results were striking.

9. The stock from which the sample was taken was very heavily attacked, and this, coupled with the fact that the time of planting was late and also therefore that the ginger had been stored for a longer period than usual, accounts for the very low yield, so that the results are purely comparative.

10. Plots of 1/32 acre were planted, one with fumigated, the other with untreated, stock, 7 lb. of ginger being used in each case.

11. The treated ginger had been exposed to the action of hydrocyanic acid gas for one-and-a-half hours, the potassium cyanide being used at the rate of 1 oz. per 100 cubic feet of space.

12. The ginger was planted in June, 1926, harvested 19th February, 1927, and the yields of fresh rhizomes were—

10 lb. 6 oz. from the fumigated material.

3 lb. 9 oz. from the untreated material.

The latter was heavily infested with scale, the former being free. The loss due to scale attack therefore, during growth of the crop, is 6 lb. 9 oz., about 65 per cent.

13. These were stored separately and weighed again on 27th June, 1927, giving 4 lb. 12 oz. for the treated, 1 lb. 2 oz. for the other. The former therefore had lost 5 lb. 10 oz., or 54 per cent. and the latter 2 lb. 7 oz., or 68 per cent. The difference, i.e. 14 per cent.,



may be taken to represent the loss due to scale attack during storage for the period from 19th February to 27th June, so that the total loss due to infestation in this case is 79 per cent. The infested ginger was practically of no value.

#### KOLA.

14. The moth, the larvæ of which bores into the kola nut, has been determined as *Characoma stictigrapta*. This species also attacks cacao in the pod.

15. Pruning in connection with both yield and control of insect pests is in progress, and the kola plot at Giehun near the arboretum will be completed at an early date. Useful results are anticipated.

16. One kola tree in Njala, which was pruned about the end of 1926, and from which there was no previous record of crop, yielded 20 pods at the end of 1927.

17. It is hoped to train someone in the practice of pruning, who will then be able to undertake work of this nature, as it is an indispensable operation for the successful cultivation of citrus and many other trees.

18. No record is to be found of the results of pruning in the case of kola.

#### THE LOCUST.—(*Zonocerus variegatus*).

19. The campaign against this pest was continued from 1926, and the poison bait proved efficient.

20. During the season, there is a definite general movement of the hoppers from their place of emergence in an easterly direction, and towards the end of the dry season the movement is in the reverse direction, so that it would appear that this locust returns to its original breeding ground.

21. Efforts to find the eggs have still proved fruitless, but search is to be continued.

22. In 1927, the first hoppers were observed in Njala on the 10th September, earlier than in 1926, and the application of the bait was commenced immediately.

23. They were less numerous than last year, and there has been no damage to crops on the Experimental Farm.

24. Supplies of poison bait have been despatched to various parts of the country, and good reports have been received as to its effect.

#### TERMITES.

25. The arsenical paint used in December, 1926, to prevent termite attack in the case of coco-nuts and citrus proved a good deterrent, and its effect persisted almost until the end of the rainy season.

26. One coco-nut palm in the compound of the District Commissioner, Waterloo, which was treated in February, 1927, has since made remarkable growth.

27. Twenty-six *termite mounds* were successfully treated with carbon bisulphide. They varied from 1 foot to 9 feet in height and from 2 to 6 feet in diameter at the base, the dosage being from 40 ccs. to 180 ccs.

28. The bisulphide is introduced through a small hole made in the top of the mound, which is immediately sealed. At least three days should be allowed for the vapour to penetrate to all parts, and to kill the inmates.

#### NEMATODES.—(*Eelworms*).

29. Tomato variety trials at Njala were interfered with by eelworm attack, and experiments included—

- (a) application of carbon bisulphide at varying distances from the plant;
- (b) surface application of lime;
- (c) regulation of watering;
- (d) spraying with Bordeaux mixture (for stimulation of growth).

30. The fruit was collected during my absence, and the records kept were not in accordance with the arrangement of the experiment, with the result that no information as to the effect of treatment is available.

#### FUMIGATION.

31. All seed and bins in the seed store were fumigated with carbon bisulphide, and suggestions were put forward as to the better care of seed intended for planting, and the means to attain this.

#### SPRAYING.

32. Various spraying was carried out, including citrus, avocado pear and kola, and many plants in Government House garden.

33. Yams in store for planting were found to be heavily attacked by a mealybug, and these were treated by immersion in a strong kerosene emulsion.

34. Agricultural apprentices and nurserymen were instructed in the preparation and application of insecticides in both the wet and dry states, also in care of machines.

#### PUBLICATIONS.

35. A pamphlet on "Garden Pests and Diseases" was prepared, together with an exhibit to illustrate it.

36. Articles on the locust (*Zonocerus variegatus*) and the ginger scale (*Aspidiotus hartii*) were submitted for inclusion in the monthly bulletin on Plant Protection issued by the International Institute of Agriculture, Rome.

#### COLLECTIONS.

37. Cases of economic insects and specimens of damage were supplied as a demonstration for the Agricultural Show at Kailahun and for use of the Agricultural Instructor and apprentices.

38. Considerable damage was caused to the general reference collection by rain owing to defects in the thatch, and it will take some time to replace ruined specimens and to rearrange the whole. This will be done as opportunity permits.

#### SPECIMENS.

39. Collection and mounting of insects, etc., has been continued, and specimens submitted to the British Museum and Kew for identification. Several additional new species were included.

#### ACKNOWLEDGMENTS.

40. Grateful thanks are due to the Director and staff of both the Imperial Bureau of Entomology and Imperial Bureau of Mycology for their valuable assistance.

I have the honour to be,

SIR,

Your obedient servant,

E. HARGREAVES,

*Entomologist.*

ON TREK,

ROTIKUNK.



## SECTION II.

## TSETSE FLY SURVEY.

## REPORT FOR OCTOBER–DECEMBER, 1927.

During the period October to December, 1927, the following treks were accomplished in connection with Tsetse Fly Survey:

*4th to 24th October.*—The following chiefdoms were surveyed (some only in part):—Bombali Granti, Bombali Sebura, Bombali Makari, Romende, Buya, Gombahun.

*29th October to 9th November and 17th November to 22nd December.*—The following chiefdoms were surveyed (some only in part):—Sarroko Limba, Mapaki, Kolifa Rowalla, Kolifa Mayosso, Bonkolenken Poli, Bonkolenken Mayoppo, Tenne, Kuniki Brina, Kuniki Sanda, Kuniki Fulawusu, Kafe, Sambaia, Dansogia. Put more briefly the area covered is that included in map sheets 39–42 and 52–53 of the Sierra Leone Survey.

The most important result of the survey was to establish that over the above area, and at the time when the survey was carried out, *Glossina palpalis* could not be regarded as a serious pest. It has a wide distribution over this area being absent, or extremely rare, in a few localities only—notably in the neighbourhood of Makeni—but in the majority of places where it does occur it is surprisingly few in numbers.

*Glossina fusca* was encountered in Kuniki Brina, Kuniki Fulawusu, Kafe and Sambaia chiefdoms. Its habitat differs from that of *G. palpalis* in that for *G. fusca*, the immediate vicinity of water is not essential. *G. fusca* occurs usually in thick forest, bush or scrub and is never encountered far from dense shade of some description. It is most commonly found along either native or game paths but has been found in a few instances where there was no obvious indication of either. Only one opportunity occurred during the period under review of verifying the truth of the common report that *G. fusca* follows herds of bush cow.

As much information as possible was obtained from native sources regarding the fauna of the country, the relation between various animals and the prevalence of tsetse fly, the seasonal variation of tsetse fly, etc. The value of this information is somewhat dubious, but it may eventually prove helpful.

Very little work has been done or attempted on the breeding places and immature stages of either *G. palpalis* or *G. fusca*. It was found to be unprofitable to pursue these lines of investigation since much time would be required to discover the breeding places of flies present in such small numbers (over the area covered) as are *G. palpalis* and *G. fusca*, and such work has little direct bearing on the survey itself.

J. G. H. FREW,  
*Entomologist, Tsetse Fly Survey.*

## PART IV.

## REPORT OF THE DIVISION OF AGRICULTURE.

## SECTION 1.

THE HONOURABLE THE COMMISSIONER OF LANDS AND FORESTS, FREETOWN.

SIR,

I have the honour to submit the following report on the work of the Division of Agriculture for the year 1927.

## AGRICULTURAL DEVELOPMENT.

2. With a total of five Provincial Superintendents of Agriculture to fill four posts, i.e. in charge of three provinces and the Experimental Farm, Njala, it has been no easy matter to keep each of the four posts continuously filled without an officer being in charge of two provinces. However, I am pleased to report, owing to the general satisfactory health of my officers, it was only necessary for an officer to fill a dual post for a comparatively short period. This could not be avoided owing to the tours of service in Sierra Leone. There

The Orange Stem-Borer (*Dirphya nigricornis*, Oliv.), to which only slight reference was made in the last report, has been bred up. The grub of this beetle has a more elongated appearance owing to the body segments being more rounded and the constrictions between them being more pronounced than is the case with the grub of the White Stem-Borer. The colour is a reddish-yellow. The adult has an orange-coloured head and thorax, and the legs and bases of the wing cases are the same. The remainder of the wing-cases, the eyes and antennae are dull black. This grub only remains in the coffee plant for one year. The egg is laid at the summit of the bush, and the grub bores into the very middle of the stem and from this high position tunnels down the centre to the very tip of the tap-root. At the upper portion the grub makes a series of circular holes from its tunnel to the exterior, and from these holes falls the frass and sawdust seen lying on the ground round the base of the plant. In all cases as yet investigated the end of the tap-root was bent up almost at a right-angle, and this bad planting may have had some effect on the plant which influenced the female beetle to select it for oviposition. The beetles may be collected during the commencement of the rains, but apart from the lines of holes described above, which are made early in the life of the grub, there will be no indication of attack until the dry weather sets in when the leaves turn yellow and droop, by which time the grub will have penetrated far down the stem. The adult beetles emerge at the beginning of the rains from a completely circular hole cut in the collar of the bush just below ground level.

As regards the stem-borers of coffee, the White Stem-Borer in particular, it must be recorded that a rather difficult position is likely to arise unless keen interest in the checking of these pests can be aroused amongst those concerned. Where coffee is being established as a definite crop it is reasonable to expect that the owner will adopt the measures recommended for the control of these insects, or other measures that may be found equally effective. But it cannot be denied that under some circumstances coffee has been, and is, planted where there is no intention of giving it proper cultivation and care. Such neglected areas become useless in a few years and are then abandoned. And they at once become an immense breeding-ground for the stem-borer. Again, small plots are established with a view to providing a supply of coffee for the household. These could be kept free of stem-borer with the greatest of ease, but the fact remains that often they are not. All such cases are a tremendous menace to those engaged in the real cultivation of this crop. The fact must be faced that under Nyasaland conditions the White Stem-Borer will always be present, as it is an insect that thrives best at the altitudes where coffee is grown in this country. Hence the necessity for taking action against this pest each year on very definite lines. Neglect of such work, or simply abandoning a coffee garden that has ceased to yield, should be looked upon by all concerned as a mark of extreme inefficiency and as setting up a very grave danger.

For those coffee planters who consider shade trees may be beneficial, *Acrocarpus fraxinifolius* merits a trial. I desire to record my opinion that a suitable shade tree, judiciously planted and properly attended, will assist successful coffee growing in Nyasaland.

#### MISCELLANEOUS.

A sudden, isolated outbreak of a brightly-coloured, blue-green weevil, *Systates sexspinosus*, Mshl., occurred on a small area of maize in the early part of the year. Dusting with paris green and flour was successful, if heavy rain did not immediately follow the application. Cyanogas dusted into the leaf sheaths rapidly killed the plants as well as the insects. The weevils feed on a variety of weeds, particularly "chanzi" (*Acrocephalus* sp., *Labiatae*), "chikongwe," and "mpolowani." It is unlikely that this insect will be more than an occasional pest of maize.

An attack of Cottony Scale (*Icerya seychellarum*, Westw.) on roses in Mlanje was found to be almost completely controlled by the Coccinellid beetle *Novius obscurus*, Wse.

Cyanogas—calcium cyanide—has proved to be an unusually efficient preparation for eliminating white ants from the brickwork of houses. Liberally used in verandas and walls where an aperture can be found that will allow the powder to descend to some depth, the complete eradication of the termites is reasonably certain.

#### CONCLUSION.

The past year has again been one in which the increase and development of the entomological collection has been seriously handicapped by the insistent calls of field work. The value of a good reference collection, not only of economic insects but of the insects of the country in general, cannot be overestimated. The provision of demonstration cases setting forth the more important pests of various crops with the parts of the plants they attack is a matter that I consider of infinitely more assistance to the practical planter than numbers of written papers. But such work requires a great deal of time and preparation, and if some particular subject arises necessitating a personal visit to a distant area under present circumstances all such work has to cease, possibly for a considerable length of time. In dealing with living insects the cessation of observations on the subject for only a few days may mean that another year must be spent in obtaining the desired information. Thus the continuity of work on a short-period, annual crop such as tobacco, coupled with the diverse climatic conditions experienced in Nyasaland from year to year and within the country each year, becomes difficult to maintain. No purely native assistance can be of value in taking accurate records or making accurate observations.

COLIN SMEE, Government Entomologist.

#### CORRIGENDA AND ADDENDA TO THE ANNUAL REPORT, 1926.

- Page 14. 1. 4. Myrmecine Ant = *Pheidologeton* sp.  
 „ 15. 6. 3. *Dicasticus*, sp. nov. = *D. mlanjensis*, Mshl. (See B.E.R., Vol. XVII, p. 212.)  
 „ 17. 1. 7. from bottom *Aularches* = *Phymateus viridipes*, St.  
 „ 19. 6. 3. *Apate* Sp. = *A. indistincta*, Murray.  
 „ 19. 6. 4. *Dirphya* sp. = *D. nigricornis*, Oliv.



## Report of the District Agricultural Officer, Fort Johnston.

I returned from leave on February 20th of this year and proceeded to my station Fort Johnston. Below is a brief summary of the work covered from the date of my return until the end of the year.

*Meteorological.*—The season's rainfall, November 1926-April 1927 was 40.30 ins., i.e. 2.02 less than in the season 1925-26, but 10 ins. above the average for the last twenty years.

*Agricultural.*—The work has been divided into—

District Agricultural Work: (a) native cotton industry: (b) general agricultural education.

*Experimental Work* (native foodstuff crops, etc.).—This work has been carried on Ntumbwasi 2 miles from Fort Johnston, a station of five acres which I opened in 1925. Recently another five-acre experimental area  $1\frac{3}{4}$  miles from Fort Johnston has been opened up with the object of studying the problems of growing dark and bright tobacco on the shore areas—rotations, etc., are included with the tobacco experiments.

*Cotton Season 1926-27.*—After rising from a district production of 31,999 lbs. in 1925 to 312,387 lbs. seed cotton in 1925, the industry has fallen off disastrously, for in the year just ended only 9,132 lbs. of seed cotton were produced in South Nyasa. The main contributing factors influencing this decline are:—(a) The flooding of the Malombe and consequent loss of South Nyasa's possibly most potential food producing area; (b) The fall in the price paid for seed cotton.

This unhappy situation arising out of (a) was greatly against cotton growing on eastern and western Malombe for, in both areas, most of the land not under water, or so soggy as to be unsuitable (save for rice), was urgently required for the cultivation of foodstuffs, and where suitable land did exist in generous acreage the Native, for the most part, apparently considered the fish industry a more lucrative and congenial occupation than that of cotton cultivation, and especially so at the lower price per pound offered this year.

Flooding likewise materially affected the cotton situation in the south-west arm (Malombe area) though in this case the flood waters were of a more ephemeral nature, abating as they did with the cessation of the rains, and consequently did not bear nearly so acutely on the general situation as falling off here as elsewhere; the reduction in price per pound of seed cotton might in this instance be taken as the predominating factor adversely affecting cotton cultivation.

With South Nyasa's best cotton producing areas so jeopardised with regard to this crop, the remaining sections of the district tending toward a greater foodstuff production, consequently with dissatisfaction at cotton prices, the present situation is not difficult to understand. However, hopeful that interest in this crop will be revived.

*Mapira.*—Personal observation gives reason to fear deterioration in the acre yields of the popular native foodcrop of mapira (*Sorghum vulgare*), and steps are being taken to investigate the cause and to endeavour to check any fall off in yield by deprecating the malpractice of excessive continuous cropping and by distributing fresh seed. Work of this nature comes under the general heading of agricultural education, and I should here like to express appreciation of the ready co-operation and valued support rendered me by Mr. A. C. Kirby, the Resident, and to thank him for the interest he has taken in matters agricultural and in my work generally.

*Ntumbwasi Experimental Area.*—Observation plots of the various varieties of sorghum grown in South Nyasa gave interesting results in yield comparisons. I herewith tabulate the varieties which have been collected in the district:—

- 1 Nnunje—*Sorghum guineense*, Stapf., var. *involutum*, Stapf.
- 2 Malalemba " " " " "
- 3 Nandonje " " " " "
- 4 Nankupi " " " " nov., near *robustum*, Stapf.
- 5 Mikota—*Sorghum* sp. intermediate between *S. caudatum* and *S. bicolor*, Moench.
- 6 Kabiliwili—*Sorghum bicolor*, Moench, var. nov.
- 7 Mapemba woyera—*Sorghum guineense*, Stapf., var. *involutum*, Stapf.
- 8 Mapemba wofira " " " " "
- 9 Litimbulangau " " " " "
- 10 Lupira—*Sorghum caudatum*, Stapf., var. *schweinfurthii*, "
- 11 Kapili " " " " *Angolensis*, Stapf.

Further types collected are to be grown for observation purposes.

*Maize (Zea mays).*—A comparative trial of Potchefstroom Pearl maize against Mkozi local maize) resulted in an interesting set of figures; the experiment is being repeated.

*Ground-nuts (Arachis hypogaea).*—For two successive seasons the local nut Ntedza we has proved a high yielder here as shown below:—

	1926	1927	Average yield per acre
Spanish bunch nut (Namiwawa)	... 770 lbs	... not grown	... 770 lbs
Chimwila (Zomba-Naisi)	... 800 "	... 980 lbs.	... 890 "
Ntedza wenandi (Fort Johnston)	... 940 "	... 1,440 "	... 1,190 "

*Finger-millet (Eleusine coracana).*—Of the eight varieties grown in one-twentieth observation plots, the early maturing variety ( $8\frac{1}{2}$  months) Kangumba from the south-west of the Lake has for two years running proved to be the heaviest yielder under Fort Johnston conditions, its yield this season being 1,040 lbs. per acre whilst the other varieties only produced

9. During the year a number of chiefs with their followers from the Northern Province visited the Experimental Farm at Njala. They were so impressed with the model oil-palm plots at this station that we have had numerous requests by the people to start similar plantations for them. Njala supplied the Provincial Superintendent of Agriculture, Northern Province, with about 6 cwt. seed to meet the requirements in his province. A large number of nurseries have been laid down. Nurseries have also been started in the Central Province to plant model plots as soon as possible.

10. At the Experimental Farm, Njala, there are small plots of the following oil-palms:—Nigerian, Hanoi Kawei and Kporlie. The Nigerian oil-palms have been bearing for five years. The writer of this report collected the seeds of the above varieties some years ago and started the plots and experiments. As the Provincial Superintendent of Agriculture's hands are so full, the recording of yields and data are under the Mycologist. The palms have grown well. I have no doubt the Mycologist will submit interesting figures. These plots have aroused considerable interest amongst all visitors and on one's tours through the provinces these palm plantations are always referred to by the natives.

11. *Swamp Rice*.—Propaganda was concentrated on the staple food of the people. A large number of experienced rice planters were selected from the Scarcies rice areas and were appointed as instructors with a view to teach the inland tribes the proper transplantation method for the purpose of utilizing the many inland swamps for growing rice. The scheme met with considerable success and wherever demonstration plots were made the people were not only interested, but in many cases got enthusiastic, so the results of the trials were very encouraging. Rice is mainly produced on upland farms by the process of "shifting cultivation" thus there is a serious annual destruction of bush. In order to avoid some of this waste the utilization of inland swamps for rice is being brought to the notice of the people. Many of these swamps could be used annually for several years, thus a form of quasi-permanent cultivation will be established.

12. In the Karene, Koinadugu and Bombali districts of the Northern Province, a determined effort was made to spread the cultivation of this crop. There is little doubt that the people will grow increasing amounts of swamp rice without very much further encouragement from us. Fifty nurseries were planted in May and June and the seedlings transplanted out in June and July. At the end of the year the harvesting had begun and the yields appeared satisfactory.

In the Central Province the swamp rice propaganda started in 1925 in the Pendembu District was intensified and extended to the Panguma, Kono and Kenema districts. In the Pendembu District supervised farms have increased from eleven in 1925 to seventy in 1927. The yields from fourteen of these farms was calculated, the average result was that for each bushel of seed sown the owner harvested 62.73 bushels, i.e. nearly sixty-threefold. In the other districts the following number of farms were planted up:—

Panguma District, six farms  
Kono District, fourteen farms  
Kenema District, five farms.

The results from the farms of the Panguma and Kono districts were not to hand when this report was written, but the Kenema District farms yielded on an average thirty-sixfold. I estimate at the present time that an upland rice farm in Sierra Leone yields about fifteenfold.

In the Southern Province swamp rice work was continued in the demonstration and instructional centres in Sembehun, Gbangbama, Sumbuya and Pujehun districts. An effort was also made to revive the cultivation of this crop in the suitable areas on Cassada Island and around Mano Salija in the Mano River District. In the Sembehun area 148 bushels of seed rice were distributed. The results were rather disappointing, for a great deal of the available cleared mangrove swamps was left unplanted. The crop was very satisfactory in most places.

In the Gbangbama District the transplanting system of cultivation is satisfactorily established now on the Gbangbatoke Creek. At Victoria (Imperri), however, the story is quite different. There the people show little interest in swamp rice cultivation. Six bushels of seed were given out, but this small quantity was not even all sown in nurseries. Reports show that the crop was likely to prove satisfactory.

Along the Jong River of the Sumbuya District the old cleared areas were again planted. The yields from only three farms are to hand, but the crop seems fairly satisfactory.



The work in the Pujehun District was chiefly confined to Lake Mabesse, where throughout the year careful observations were made of the lake's behaviour as to rises and falls, etc. Rice trials are in progress with early maturing rices with the object of taking a crop between the time the water subsided in January and the time when flooding begins again about April. There are certain very large inland swamps (termed lakes) that present certain difficulties in the cultivation of rice, as the waters are uncontrollable during the rains. These trials have been drawn up to carry out tests which, if successful, will bring under cultivation of rice several thousands of acres. The experiments are not sufficiently advanced to report any conclusions. The people living round these lakes are chiefly fishing folk and from their trade they derive an assured income, consequently they are not very interested in swamp rice cultivation. However, if a good rice crop can be grown on the margins of these lakes, there is no doubt that people, willing to grow rice, will migrate to these areas from other chiefdoms.

13. *Castor Beans*.—The intensive propaganda for planting castor beans during the past two years has been very well responded to by the natives. There is now a considerable quantity of plants around most towns and villages. It is unfortunate that the price of these beans is only 1d. per lb. as there are fairly large quantities available for purchasers in the Koinadugu and Bombali districts of the Northern Province and in the Pendembu, Panguma and Kono districts of the Central Province.

14. *Ginger*.—It is most unfortunate that this important export product of Sierra Leone experienced such a depressing market in 1927. The price was so low that farmers did not harvest their entire crops and the price discouraged many in extending its cultivation. The division, however, sent instructors through the ginger-growing areas to encourage the people and demonstrate to them the proper preparation of the crop. There is no doubt the quality of ginger has improved, and when this article does come under inspection, I hope to see a still greater improvement.

15. *Ground-nuts*.—The beneficial effect of introducing fresh ground-nut seed was again very marked in the Koinadugu District of the Northern Province. The crop was a good one and, coupled with the fact that considerably larger areas were under this crop, the state of affairs was very satisfactory.

16. I wish to place on record my appreciation of the way in which the Provincial Superintendents of Agriculture, together with their subordinate officers, have carried out the division's programme of work. It is entirely due to their energy, enthusiasm and zeal that a successful year of marked progress has been attained. In this appreciation, I wish to couple the names of the many political officers for their interest and active assistance in our varied programme.

#### EXPERIMENTAL, DEMONSTRATION AND OTHER FARMS.

17. *Experimental Farm, Njala*.—This is the central experimental station of the Division of Agriculture. It is in charge of a Provincial Superintendent of Agriculture.

#### PERMANENT PLANTATIONS.

18. (a) *Dominica Limes, Plot 1*.—This is an eleven-year old plantation. The trees are planted 15' x 15'. Manurial trials were started in 1925. The manuring in 1925 and 1926 was as follows:—

*Section 1*.—1 cwt. sulphate of ammonia per acre, 4 cwt. muriate of potash per acre, 3 cwt. superphosphate per acre.

*Section 2*.—24 cwt. lime per acre.

*Section 3*.—Control.

At the close of 1927 the above dressings were altered to—

*Section 1*.—Same as above.

*Section 2*.—1 cwt. sulphate of ammonia per acre, 4 cwt. potash per acre.

*Section 3*.—Control.

The 1926 harvest figures appeared to show that lime applied to section 2 was unnecessary and the 1927 figures below again showed a marked decrease in yield when lime is applied:—

1927 yields from Dominica limes, Plot 1.

Section 1.	Section 2.	Section 3.
571.43	327.75	373.56

The above figures are in bushels per 100 trees. There was a marked increase in yields over 1926. This is probably due to the thorough pruning of the trees. There is no doubt that the trees are too close, so half the plantation has now been thinned by each alternate tree being cut out.

(b) *Stenophylla Coffee, Plot 3*.—This plantation is eleven years old. Manurial trials were started in 1925 as follows:—

*Section 1*.—1 cwt. sulphate of ammonia per acre,  $\frac{1}{2}$  cwt. superphosphate per acre, 1 cwt. potash per acre.

*Section 2*.—Control.

The above manuring was repeated in 1926, but at the close of 1927 the trials were altered to—

*Section 1*.—0.34 lb. sulphate of ammonia per tree, 0.34 lb. muriate of potash per tree, 0.17 lb. superphosphate per tree.

*Section 2*.—0.34 lb. sulphate of ammonia per tree, 0.17 lb. superphosphate per tree.

*Section 3*.—Control.

The new manuring did not effect the 1927 crop which yielded after the 1925 and 1926 manuring as follows in 1927:—

Section 1. Manured (100 trees)	Section 2. Control (100 trees)
166 lb. 1 oz.	77 lb. 12 oz.

(c) *Kola, Plot 4*.—This is an eleven-year old plantation. During the past the yields have been considerably reduced probably by the attack of psyllids. The trees are now being pruned on the instructions of the Entomologist.

(d) *Orchard and Arboretum, Plot 6*.—The grafted citrus stock were again manured with Kraal manure and pruned. There was a fair crop of Tangerines and grapefruit. The grafted mangoes did not bear. The Jackfruit produced a heavy crop.

*Calopogonium Muconoides* was sown as a cover crop; this has given a fair cover, the plant requires weeding and attention in its early stages. In the past grasshoppers (*Zonocerus variegatus*) have done serious damage, especially to the citrus stock, but as a result of the Entomologist's poison bait campaign, the trees were free from damage at the end of 1927. The Entomologist's operations have been most successful.

(e) *Oil-palm Plots*.—Nigerian oil-palm, plot 10; Kporlie oil-palm, plot 11; Hanoi oil-palm, plot 32; Kawei oil-palm, plot 61. All the above plots have been kept in excellent condition. The lalang grass in plot 32 has been dug out and the plot planted up with a cover crop. The harvesting and recording of these plots are under the Mycologist.

(f) *Tea, Plot 14*.—This was planted out in 1925. The condition of these plants has improved. *Calopogonium Muconoides* was sown as a cover crop in 1926. During that year it made only slow growth, but during 1927 it has done very well and given a dense cover, though it has been a little too rampant, covering some of the tea bushes.

(g) *Grafted Citrus Stock, Plot 15*.—This plot was started in 1925 with South African grafted orange stock of Washington Navel and late Valencia. They have made great strides in 1927 as they were kept free from the attack of grasshoppers (*Zonocerus variegatus*), vide (d) above. The grapefruit imported from Florida in 1926 were planted out. It is unfortunate that these young plants, while in the nursery, suffered seriously from flooding. Since planting out, they have come on very well.

(h) *Canary Bananas, Plot 38a*.—One acre was planted up in August.

(i) *Canephora Coffee, Plot 57*.—This was planted in 1922. The plot was manured at the end of 1927 as follows:—

*Section 1*.—0.34 lb. sulphate of ammonia per tree, 0.34 lb. muriate of potash per tree, 0.17 lb. superphosphate per tree.

*Section 2*.—0.34 lb. muriate of potash per tree, 0.17 lb. superphosphate per tree.

*Section 3*.—Control.

In 1927 this plot yielded 914 lb. cherries. This crop was not then affected by the manures applied.

(j) *Sierra Leone Limes, North Farm*.—This plot was started in 1914. The 231 trees on this plot yielded 978.79 bushels of limes.



(k) *Robusta Coffee, North Farm*.—During the year under review, 500 trees yielded 379 lb. 8 oz. of cherries. At the end of the year the following manurial trials were started:—

*Section 1*.—Sulphate of ammonia, 0.34 lb. per tree, muriate of potash, 0.34 lb. per tree, superphosphate, 0.17 lb. per tree.

*Section 2*.—Sulphate of ammonia, 0.34 lb. per tree, muriate of potash, 0.34 lb. per tree.

*Section 3*.—Control.

(l) *Liberian Coffee, North Farm*.—This plot consists of trees producing large, medium and small cherries.

The 1927 yields were as follows:—

Large cherries	...	...	...	...	...	577 lb. 8 oz.
Small and medium	...	...	...	...	...	319 „ 12 „

(m) *Lacatan Bananas*.—This is a local variety of banana found in the Port Loko District; as it resembles the Lacatan Banana of the Phillipine Islands, a variety that is immune to Panama Disease, this trial plot was laid down. This local variety has not proved itself immune. The plot has been isolated.

#### ANNUAL CROP TRIALS.

19. *Cotton Trials*.—Seasonal and variety trials were continued with the following cottons:—Allen Long Staple, Cambodia, Delta Webber, four strains of Nigerian Cotton Ishan, Acala, Nunns 37 and three strains of Punjab American.

As most of these cottons were planted at the end of the rains, the harvesting was not completed until 1928. The trials on the whole were disappointing; the plants did not seem happy and vigorous under Sierra Leone conditions.

20. *Manurial Trials on Ginger, Ground-nuts and Rice. Plot 9a Ginger*.—This crop was planted in May, but the crop was not ready for harvesting at the end of the year.

*Plot 9b, Ground-nuts*.—The seeds for these trials were imported from Konakry (French Guinea). The seeds were immersed in a 2 per cent. solution of copper sulphate for ten minutes before sowing as a protection against *Cercospora personata*, but this did not have the desired effect.

The yields from these were—

					Yield per Tenth Acre.	
Manure.				Section Number.	Bushels.	Lb.
N. P. K. and lime	...	...	...	15	4 $\frac{1}{2}$	94
"	...	...	...	17	5	114
N. P. K.	...	...	...	1	4	71
"	...	...	...	8	5 $\frac{1}{2}$	113
N. P. and lime	...	...	...	2	4 $\frac{3}{4}$	98
"	...	...	...	9	5 $\frac{1}{2}$	121
N. P. ...	...	...	...	11	4 $\frac{1}{4}$	77
"	...	...	...	18	5 $\frac{1}{4}$	111
N. K. and lime	...	...	...	4	5	105
"	...	...	...	6	3 $\frac{3}{4}$	78
N. K. ...	...	...	...	13	4 $\frac{1}{4}$	86
"	...	...	...	20	4 $\frac{1}{2}$	92
P. K. and lime	...	...	...	12	5	108
"	...	...	...	19	5 $\frac{1}{2}$	113
P. K. ...	...	...	...	3	5 $\frac{3}{4}$	115
"	...	...	...	10	5	102
Control with lime	...	...	...	7	5 $\frac{1}{4}$	110
"	...	...	...	14	5	111
Control (no manure)	...	...	...	5	3 $\frac{1}{4}$	73
"	...	...	...	15	3 $\frac{1}{2}$	76

N=Sulphate of ammonia at the rate of 2 cwt per acre.

P=Superphosphate at the rate of 2 cwt. per acre.

K=Muriate of potash at the rate of 2 cwt per acre.

Lime was applied at 2 tons per acre.

*Plot 9c, Rice.*—These trials were carried out on an upland farm with a local variety of rice called Jobboi. The seed was sown at the rate of one-and-a-half bushels per acre.

The yields were—

Manure.	Section Number.	Yields in Lb. per Tenth Acre.	Weight per Bushel Paddy Rice.
N. P. K. and lime ... ..	15	104	41½ lb.
" " " " " " " " " "	17	107	42 " "
N. P. K. " " " " " " " "	1	128	41¾ " "
" " " " " " " " " "	6	116	41¾ " "
N. P. and lime " " " " " "	2	127	42¾ " "
" " " " " " " " " "	9	90	42½ " "
N. P. " " " " " " " " "	11	112	42½ " "
" " " " " " " " " "	18	84	41¾ " "
N. K. and lime " " " " " "	4	119	41¾ " "
" " " " " " " " " "	6	99	41½ " "
N. K. " " " " " " " " "	13	98	41½ " "
" " " " " " " " " "	20	106	41¾ " "
P. K. and lime " " " " " "	12	122	41½ " "
" " " " " " " " " "	19	99	42 " "
P. K. " " " " " " " " "	3	108	41¼ " "
" " " " " " " " " "	10	106	41½ " "
Control with lime " " " " " "	7	112	42½ " "
" " " " " " " " " "	14	96	41½ " "
Control no manure " " " " " "	3	123	41½ " "
" " " " " " " " " "	16	124	41½ " "

For a key to N. P. K. and lime, see the ground-nut manurial trials above on plot 9b.

21. *Rotational Trials, Plot 27.*—In 1926, Pigeon-pea was grown on this plot; the crop was dug in November of the same year, and in 1927 the plot was sown with upland rice (Jobboi) at the rate of one-and-a-half bushels per acre. The yield was a very low one of four bushels per acre. This plot has been under continuous annual cropping since 1912.

*Plot 28.*—This plot was planted with a quick maturing variety of cassada in June, 1926, and was harvested in May, 1927; the yield was 5 tons 4 cwt. 59 lb. per acre. As soon as this crop was off, pigeon-pea was sown. This was dug in as a green manure in November, 1927. This crop gave about 12 tons of fresh green stuff.

*Plot 29.*—In 1926 ginger was planted. The crop was a very poor one when harvested in March, 1927, due to the rhizomes being badly attacked by scale insects. In April, 1927, velvet beans were sown as a cover crop and green manure. These did not prove a success owing to poor germination, consequently the plot was not well covered. The surviving plants did very poorly. This cover crop with weeds were turned into the soil in August after which Allen Long Staple cotton was sown. In November the cotton plants went off owing to lack of moisture, a heavy shower of rain in early December revived them, but the crop was a poor one. This plot has been under continuous cultivation since 1912.

*Plot 30.*—In 1926 the plot was sown with rice. In May, 1927, ground-nuts were planted; the seed was imported from Konakry (French Guinea). Although the crop was badly attacked by *Cercospora personata*, it yielded 23½ bushels per acre. A satisfactory yield, when considering this plot has also been under continuous annual cropping since 1912.

22. There were a great variety of other crops and plants under trial, sisal hemp, Mauritius hemp, swamp rices, yams, adlay, castor beans, legumes, maize, cassada, sugarcane, etc. The scope of this report does not permit one to deal with each and every crop.

23. *Nurseries.*—The nurseries form an important part of the work at Njala. Here exotic plants are "tried out," imported plants nursed and propagated, and thousands of economic plants and trees raised for distribution to other stations of the Lands and Forests Department and other Government departments, and to chiefs and private farmers both in the Protectorate and Colony. Seed germination tests are carried out here. Trials were also carried out with tomatoes and onions. The future success of a plant depends very



much in its nursing and care after germination, consequently a large amount of time of the Provincial Superintendent of Agriculture is spent in raising good stock. The only supply of young stock in Sierra Leone is from the Lands and Forests Department's nurseries as there are no private nurseries from which farmers and planters can obtain their stock. That is sufficient proof of the importance of the work that is being carried out in our nurseries.

24. *General Maintenance of Njala.*—The European and African residential areas and the station roads have been kept in good order and clean and tidy. Also the building and repair of about eighty buildings of native construction have been supervised by my division under the care of the Provincial Superintendent of Agriculture in charge, Njala. Although these operations are outside the sphere of agriculture, they have to be carried out by my division, and considerable credit is due to the Provincial Superintendent of Agriculture at Njala that he carried out these multifarious duties with success.

25. *Makump Experimental Farm.*—This is a small farm at the headquarters of the Provincial Superintendent of Agriculture, Northern Province.

The permanent plantations consist of cocoa, kola, coffee and oil-palm. Trial plots were sown with legumes, Indo-China swamp rice, yams, cassada, ginger, egusie, cotton, ground-nuts, onions, tomatoes, tobacco, Efwatakala grass and maize.

26. This farm is of interest to the people of the locality and useful information is being collected there. The nursery plays an important part in raising stock for farmers. The nursery was efficiently kept.

27. *Bedu Demonstration Farm.*—This farm was started at the request of the energetic and enterprising Paramount Chief, Momo Banya, of the Luawa Chieftdom in the Pendembu District. A few annual crops were tried out on the land, as maize, cotton, egusie and cover crops. The main work on this farm will be the permanent plantations of oil-palms, kola, coffee, cocoa and fruit trees. A start has been made with the kola, coffee and cocoa plots. In 1928 I expect to see the programme completed as the farm has an excellent nursery with a good stock of seedlings ready for planting out when the season comes.

28. Paramount Chief Momo Banya has now constructed an excellent motor-road, off the Kailahun-Mafindu motor-road, through the farm to the rest-house.

29. *Kainkordu Experimental Farm.*—The farm was originally opened in 1925 for cotton trials which were not a success. As Paramount Chief Foyo was anxious to start a model farm of his own, the department gave him every facility to do so for the purpose of encouraging agriculture in his chieftdom. This farm has been kept on with the object of planting permanent crops for the chief. The work is being supervised by the Division of Agriculture. An African agricultural assistant has at present his headquarters at Kainkordu, but as new political headquarters are opened at Sefadu (Kono District), the agricultural assistant will be stationed there to assist the farmers in the new district of Kono. Kola and coffee plantations have been laid down and a nursery has been started with various economic trees.

30. *Daru Farm.*—As the headquarters of the Provincial Superintendent of Agriculture, Central Province, was made temporarily at Daru in 1926, a small piece of land was kindly given to this division in the Royal West African Frontier Force cantonment at Daru for nurseries and carrying out a few tests. A small plot of *Canephora* coffee was started.

31. *Pujehun Demonstration Plot.*—The object of this farm is to carry out rotational trials and to establish demonstration plots of permanent crops. It was started in 1926.

The system of cropping on the rotational trial plots in 1927 was—

*Plot 1.*—Leguminous crops ( $\frac{1}{2}$  acre ground-nuts,  $\frac{1}{4}$  acre pigeon-peas and  $\frac{1}{4}$  acre velvet beans). The yield of ground-nuts was from plot 1b (ridged) 496 lb. per acre, from plot 1d (sown on flat, earthed up later) 298 lb. The crop of velvet beans was good though many beans were lost through damage by rain when maturing. The pigeon-pea was a poor crop and was dug in.

*Plot 2, Rice.*—The crop grew very well and promised a heavy yield. This was hardly realized as there was a fairly high proportion of light grains. Yield 821 lb. per acre.

*Plot 3, Root crops.*— $\frac{1}{2}$  acre Chinese yams,  $\frac{1}{4}$  acre cassada and  $\frac{1}{4}$  acre sweet potatoes; with the exception of sweet potatoes, these crops were unharvested at the end of the year. Sweet potatoes turned out a poor crop—yield 648 lb. per acre.

*Permanent Plantations.*

*Plot 4.*—Planted to cocoa in August. Plot has done only moderately well. A large number of plants shed their leaves in November. They have been heavily mulched and provided with artificial shade.

*Plot 5.*—Liberian coffee planted in August. The plants are healthy and thriving well.

*Plot 6, Kola.*—Planted in August. Plants are very healthy and thriving.

*Plot 7, Robusta Coffee.*—Planted in August. Healthy and thriving.

*Plot 10, Sisal Hemp.*—Planted in July. Mostly thriving but some of the suckers planted were too small and will be replaced in 1928 to level up the plot.

*Nursery.*—This has been well maintained chiefly for seedlings of Liberian coffee and cocoa.

32. *Zimi Model Farm.*—As there was no trained officer available to put in charge of this farm, it was considered advisable to curtail the work here to mainly maintenance of the nursery. It is hoped to open it in 1928 with the appointment of a trained African agricultural assistant.

33. *Agricultural Survey of the Protectorate.*—One of the duties of the Provincial Superintendents of Agriculture is to collect all data with regard to crops, soil, oil-palms, vegetation, etc., with the object of having full information on each chiefdom in their provinces. In order that such a survey is complete and reliable, it requires time and care. My officers have collected a large amount of useful data and a few comprehensive reports on chiefdoms have already been submitted.

34. *Soil Surveys.*—Practically all the soil samples supplied to the Agricultural Chemist have been taken by my officers who at the same time supplied the Agricultural Chemist with all the local information required for such surveys. That is my officers acted as "field officers" in connexion with most of the soil work that the Division of Research has dealt with in the past.

35. *Scheme of Agricultural Training for the Sierra Leone Battalion, Royal West African Frontier Force.*—A scheme was submitted at the beginning of the year and approved for the training of the soldiers of the Royal West African Frontier Force. The scheme is a very promising one and should lead to beneficial results. My division is whole-heartedly co-operating with the battalion to make it a success.

One of the apprentices trained by the Agricultural Instructor for three years at Njala has now been posted to the battalion as teacher. A start was made in 1927 with swamp rice and land was prepared for annual cultivation. The division's nursery at Daru has been handed over to the Officer Commanding so that in 1928 a start can be made with kola, cocoa and coffee plantations, and by 1929 a model oil-palm plot should be laid down.

It is hoped with such a training that the soldiers, after a military career, will be fitted to take up agriculture in their chiefdoms. The agricultural teaching will be simple so that the ideas can be put into practice by native farmers.

36. *District Agricultural Show at Kailahun, in the Pendembu District of the Central Province.*—In the past we have held Provincial Agricultural Shows which proved to be too large and of little practical value because, owing to the distances one had to travel and send exhibits, the real farmer did not benefit. It was found that paramount chiefs and chiefs were exhibitors in an overwhelming majority. Therefore in 1927 a new departure was tested in making the show a district one and only open to the people of that district. The show was an unqualified success. There were over 1,400 entries up to the required standard and actual cultivators, producers, and craftsmen took an interest in the show and formed the majority of the exhibitors, and a pleasing factor was that they won 90 per cent. of the prizes.

The Officer Commanding the Royal West African Frontier Force, Daru, kindly permitted the regimental band to be present at the show. The band was a great attraction. Paramount Chief Momo Banya of Kailahun, Luawa Chiefdom, and his people are to be congratulated on the way they carried out the arrangements under the energetic and enthusiastic leadership of N. C. Hollins, Esquire, District Commissioner, and J. V. R. Brown, Esquire, Provincial Superintendent of Agriculture, Central Province.

37. *British Industries Fair, 1927.*—Most of the exhibits for the above Fair, which was held in London in the early part of the year, were prepared by the officers of my division.

38. *Shipment of Fresh Limes to England.*—As a result of the British Industries Fair, Messrs. L. Rose and Company, Limited, supplied us with barrels and paper wraps. Ten barrels of fresh limes were shipped. These arrived in good condition and it was reported



that the quality and flavour of the juice appeared to be quite satisfactory. Messrs L. Rose and Company, Limited, were charged 1s. 6d. per 100 for the limes. They wrote on this as follows:—

“We are afraid that the cost by the time we get the limes here is too high, but nevertheless we are very glad that we are able to get these two shipments, because should we later on be in a position to pay a higher price for the fruit, we should be practically assured that it could be got over here in good condition.”

This matter was followed up and Messrs. L. Rose and Company, Limited, were asked what they were prepared to pay. The reply was as follows:—

“We are not using these for sale as fruit and consequently we should not be in a position to pay a price for the fruit that would be out of proportion to the cost of our juice from the West Indies. It is possible to get a better juice by squeezing the fruit in London, but at the same time the difference in quality is not so marked that it would be a desirable proposition to use juice as yielded by fruit in London at a greatly increased cost. On this basis we do not think that the fruit would be worth more to us than about 10s. per barrel in London and we are afraid this price would be of no interest to you at all, especially if shipments had to be made to Liverpool, as the dock charges and rail to London amounts to something like 7s. per barrel.

“We would suggest that in order to market your crop to the best advantage it would be advisable to try and interest some of the large London stores, hotels, etc., in the fruit.”

39. A barrel contained about 1,500 fresh limes, each fruit being wrapped in paper. I note the cost of fresh limes in Dominica, British West Indies, ranges from 2s. 6d. to 3s. per barrel supplied to a factory for extraction of lime juice. In the circumstances the limes are, needless to say, not wrapped in paper.

40. *Agricultural Instruction*.—There was a full complement of apprentices (twenty-five) under training during the year. The Agricultural Instructor was on duty throughout the session, January to October, at the end of which he was on vacation leave. At the same time the apprentices were given leave in batches so as not to interfere with the work on the model farm. This system works very satisfactorily.

41. The apprentices made satisfactory progress in their work and studies. Useful work was done on the model farm where experiments on rice, green manures, cover crops and rotations formed the most important items in the programme. The selection work on the indigenous cotton Quande has been continued. Samples of the 1926-1927 crop were sent to the British Cotton Growers Association who reported on 17th March as follows:—

Mark.	Classification, etc	Value.
A	White, but blotched with stain, staple $1\frac{1}{16}$ ins. strong but rather mixed with short.	75 to 100 points on
B	White, but blotched with stain, staple about $1\frac{1}{8}$ ins. mixed with short strong.	50 to 75 points on

*Based on March American Futures at 7.15d.*

“As regards the valuation, there appears to be a shortage of this particular class of cotton at the moment, and if it were here on the spot the “A” sample might fetch anything from 75 to 100 points on. As regards “B,” this might fetch 25 points less, but of course both these valuations are purely nominal, and are based on the assumption that there would be a commercial quantity of not less than twenty-five bales of each, and that the bulk would be equal to sample. Furthermore, as pointed out, this is a special valuation on account of the shortage and with any quantity on the market the basis would vary, so that it must not be taken that you would always be able to get the premium.”

The above report is very encouraging. It must be clearly understood that this is a report on an indigenous cotton that has undergone selection. So far the Division of Agriculture has not met with success in establishing exotic cottons, therefore, the encouraging results on selection of the indigenous Quande cotton is of importance.

42. At the close of the 1927 session the first batch of apprentices qualified for appointment. Six passed out. One was appointed teacher to the Royal West African Frontier Force in connection with the scheme of agricultural training mentioned in my paragraph 35 above, and five were appointed fourth grade agricultural assistants in the Division of Agriculture.

43. *The Grading and Packing of Fruit for Shipment.*—The writer whilst on leave during the months of January and February visited Covent Garden, Hull and Liverpool, to enquire into the grading, packing and shipping of fruit. He submitted a full report on his return to duty. This report is now printed for public information.

44. *Imperial Agricultural Research Conference.*—Mr. P. J. Moss, Provincial Superintendent of Agriculture, who was on leave at the time the Conference was held in London, was one of the department's delegates at the conference.

#### AGRICULTURAL CROPS.

45. *Rice.*—1927 will be remembered as being a good rice year. The upland farms as a whole burnt well with the result that the rice was sown up to date and the rains suited its growth. Owing to the propaganda of the Division of Agriculture, there was an increase of swamps under this crop and the Scarceries rice fields were reported to have yielded good crops. The price of clean rice soon after harvest was as low as 4s. to 6s. per bushel of 84 lb.

*Kola.*—The crop was plentiful but the price was low. The 1927 export of kola nuts, however, exceeded 1926 by about 1,450 tons. There is no doubt that the trees are responding to their better care advocated by the Division of Agriculture.

*Cocoa.*—The report of this crop is on the increase, approximately 77 tons were shipped. The price ranged from 3d. to 5d. per lb.

*Ginger.*—The low price offered for ginger last season naturally reacted on the export figures. The price offered was such that the farmers did not bother to harvest this crop, which was normal and up to average. Only 27,354 cwt. were shipped, which figure is 50 per cent. less than the 1926 shipments.

*Chillies.*—The good market resulted in increased purchases. 31 tons were shipped. This is a 50 per cent. increase on 1926.

*Ground-nuts.*—This crop does not appear as an export product as the local output does not meet the demand, and also our main ground-nut producing areas are in the Koinadugu and Karene districts of the Northern Province where the natives often find it easier to dispose of their surplus crop in the neighbouring French territory rather than transport it long distances to trading centres on the branch line.

*Piassava.*—2,418 tons were exported, which was an increase of 335 tons over 1926. Steps are being taken to improve the quality of our piassava.

*Palm Kernels.*—There is an increase of 1,436 tons of kernels in 1927 over 1926. The total export for 1927 was 65,436 tons.

*Palm Oil.*—3,609 tons were exported, showing an increase of 744 tons over 1926.

The season was a good one for other agricultural crops which hinged on the satisfactory burning of farms. Agriculturally, 1927 was a very satisfactory year. The export figures quoted above show a general all-round increase except in the case of ginger, but this was not due to a poor crop, it was entirely due to a low price offered to the farmers. If the price has been anything like that of 1926, the export figure would have been quite as high.

46. Appendices.—A Meteorological Data for Njala, 1927.

B. Rainfall Data, 1927.

I have the honour to be,  
SIR,  
Your obedient servant,

DOUGLAS W. SCOTLAND,  
*Director of Agriculture.*

DIVISION OF AGRICULTURE,  
NJALA, via MANO,  
1st March, 1928.



APPENDIX A.  
METEOROLOGICAL DATA FOR NJALA—1927.

MONTH.							SHADE.		Total Rain- fall for Month.
							Maxi- mum.	Mini- mum.	
January ...	...	...	...	...	...	...	92·00	66·32	—
February ...	...	...	...	...	...	...	97·25	67·04	2·00
March ...	...	...	...	...	...	...	97·25	64·77	4·00
April ...	...	...	...	...	...	...	96·03	70·83	8·91
May ...	...	...	...	...	...	...	92·36	69·97	14·65
June ...	...	...	...	...	...	...	95·00	70·00	12·33
July ...	...	...	...	...	...	...	93·06	66·26	13·46
August ...	...	...	...	...	...	...	87·42	66·61	12·66
September ...	...	...	...	...	...	...	89·50	67·73	16·44
October ...	...	...	...	...	...	...	89·74	69·65	14·72
November ...	...	...	...	...	...	...	95·96	68·77	3·74
December ...	...	...	...	...	...	...	95·13	70·03	1·14

## Appendix B.

## RAINFALL DATA, 1927

	MONTH	Batkamu.	Bo.	Bonthe	Daru.	Kabala.	Kissy.	Moyamba.	Njala.	Freetown.
January	...	...	27	...	...	...	...	...	...	...
February	...	...	42	80	3.22	11	...	50	2.00	...
March	...	31	4.74	1.56	8.46	78	44	1.79	4.00	0.22
April	...	2.81	3.34	8.50	4.95	4.48	8.46	6.83	8.91	6.90
May	...	8.34	9.06	12.58	14.73	10.73	10.59	10.64	14.65	9.52
June	...	19.50	19.51	34.17	13.74	14.33	17.08	16.25	12.33	20.46
July	...	12.43	18.89	42.66	13.38	9.05	34.29	14.71	13.46	34.16
August	...	15.31	12.93	15.52	8.67	8.05	17.74	14.57	12.66	22.02
September	...	18.00	12.75	24.94	13.77	20.93	23.21	17.88	16.44	24.50
October	...	19.30	12.34	17.29	15.14	20.06	16.70	14.06	14.72	12.63
November	...	1.68	4.75	7.70	4.89	1.05	2.90	4.00	3.74	4.48
December	...	...	1.43	74	38	33	0.2	43	1.14	0.23
Total	...	97.68	100.43	166.46	101.33	89.90	131.43	101.66	104.05	135.12



## PART V.

## REPORT ON THE DIVISION OF FORESTS.

THE HONOURABLE THE COMMISSIONER OF LANDS AND FORESTS, FREETOWN.

SIR,

I have the honour to submit the annual report on the Division of Forests for 1927.

2. *Staff*.—(Owing to the incidence of leave and shortage of staff, most of the Forests offices were unfilled during a great part of the year.

The following table shows the approximate numbers of officers available during the year to administer the six offices which comprise this division. There were present—

5 officers for one month  
4 officers for two months  
3 officers for three months  
2 officers for six months.

3. The above table shows the serious shortage of staff from which the division suffered throughout the year. When it is remembered that the Mabang palm plantation, which absorbs the whole time of one officer, is a purely agricultural undertaking, and that the officer in charge of the Eastern Circle had to spend much time on rubber tapping, it will be understood that very little forestry was possible in 1927.

4. *Examination of Forests*.—A small range of hills in Malal West Chiefdom (Northern Circle) was examined and reported on. In the Eastern Circle the Mamba and Kisi mountains in the Pendembu District, and the Singamba hills in the Kenema District were also examined. It was determined to proceed with the reservation of these three areas in due course, but by the end of the year the formal "Request" by the tribal authority for the Singamba hills had not been received. With regard to the Mamba and Kisi mountains, the District Commissioner has asked for the reservation to be postponed until the topographical survey has passed over the area.

5. *Constitution of Reserves*.—The only reserve constituted during the year was the "Malal West" Reserve. This reserve is 1·31 square miles in extent. It occupies the crest of a range of hills which rise to an estimated height of about 800 to 900 feet above the level of the surrounding plain. It is the last patch of forest situated in a large area consisting of much open grassland.

6. Although the demarcation of the proposed Tama Forest Reserve (about 66 square miles) was completed by August, 1926, the acute shortage of staff has rendered it impossible hitherto for the Reserve Settlement Court to sit and the reserve to be constituted.

7. The list of reserves and restricted areas now constituted is as follows:—

RESERVES.		RESTRICTED AREAS.	
Colony :	Sq. Miles.		Sq. Miles.
Colonial ...	73·39		
Leicester Peak ...	·23		
Protectorate :			
Kesewe Hills ...	9·01	Bompe River ...	30
Kambui Hills ...	56·00	Ribi River ...	12
Nimini North ...	48·50	Yonni East ...	1
Nimini South ...	10·03	Yonni West ...	1
Dodo Hills ...	8·40		
Gobo Hills ...	4·46	Kholofa Mabang ...	1
Kagnari Hills ...	33·10	Senahun West ...	8
Moyamba Hills ...	·73	Bafi and Sewa River ...	20
Bojene Hills ...	2·85		
South Kambui ...	3·36		
Gboi ...	·79		
Gola Forest (West) ...	24·03		
Gola Forest (East) ...	88·16		
Tonkoli Reserve ...	184·00		
Malal West Reserve ...	1·31		
	548·35 sq. miles.		73 sq. miles.

8. *Demarcation of proposed Reserves.*—In addition to the demarcation of the Malal West Reserve (which was demarcated and constituted in the year under review), the demarcation of the Gori hills and the Gola North proposed reserves was continued.

9. *Forest Exploitation.*—No timber extraction from forest reserves was carried out during the year, with the exception of 115 trees taken singly on licence by timber cutters from the Colony Reserve.

10. Officers of the Forest Service located and marked some 35,500 cubic feet of timber in various forests, with a view to their being extracted and utilized by the Public Works Department for furnishing new Government offices and for the construction of road bridges. The trees for furniture (between 500 and 600 cubic feet) were ringed by this department and left standing to season.

11. The gum copal forests were open for tapping on 1st October, and 167 tapping licences were issued. The forests were tapped, but the gum will not be ready for collection and sale till about the middle of 1928.

12. *Plantations and Nurseries.*—The existing plantations in the Kambui Reserve were beaten up and extended. During July and August some 10,000 seedlings were planted out. The species used were mainly good local timbers (*Azcleio Eutandphragma*, *Lophira*, *Chlorophora*, *Heritiera* and *Terminalia*) and the object of the plantations is to gain knowledge regarding the behaviour of these species under artificial regeneration.

13. The firewood plantation at Makeni was cleaned and beaten up. Unfortunately during most of the year there has been no Assistant Conservator in charge.

14. In the Gola East Reserve a small experimental plantation was made with a view to the ultimate adoption of some system of regeneration in conjunction with rice farmers. The initial object, which it will probably take several years to attain, is to impress on the conservative and suspicious rice farmers that there is some possibility of farming within forest reserves, in conjunction with this department, and that such a possibility contains advantages from their point of view. No attempt was made on this occasion to impose conditions. The area was cleared and planted by this department, and the farmers were invited to raise a crop of rice for their own use on the cleared land amongst the newly planted trees. The farmers got a satisfactory crop, and in this respect the experiment was successful. The species used were Eucalypts which happened to be the only plants available. They have not done well, but, so far as can be ascertained, their failure was not due in any way to the crop of rice. It is hoped to continue these experiments in future years, using indigenous species which afford better prospects of success.

15. Small nurseries were maintained at the headquarters of the northern, southern and eastern circles for raising seedlings for future planting experiments. As has already been said, the shortage of staff and the urgency of reservation work makes it impossible to attempt any large scale regeneration schemes.

16. The foregoing paragraphs give an account of the forestry activities of the division during the year. I give below an account of its other activities.

17. *Oil-palms.*—The five-acre plots and palms at Circle headquarters were maintained, and the records of yields kept. Unfortunately, much of this work has to be done by African officers.

18. The nursery for Tugboi palms in the Gola East Reserve was maintained. Germination proceeded throughout the year, but this variety germinates so slowly as to render its propagation almost impossible unless some hitherto undiscovered means are found to accelerate germination. Most of the seed behaves as if it were infertile and, of course, it remains to be seen what type of palm will result from Tugboi seed.

19. One hundred and eight seedlings of this variety have now been planted out and are thriving.

20. *Mabang Palm Plantation.*—An Assistant Conservator was posted to Mabang in April with instruction to organize the plantation, and plant the first 500 acre block of the 2,000 acres which comprise the plantation. Arrangements had to be made for the collection and housing of a labour force of about 500 men. This and preliminary survey work delayed the beginning of cleaning until June, and it was found to be impossible to complete the planting of the 500 acres during the 1927 season. Some 300 acres were, however, planted with Hanoi palms and, although some poor seedlings had to be used, the palms are, on the whole, in a thriving condition.



21. Extensive nursery preparations were made for raising seedlings for subsequent years, and a large quantity of Hanoi seeds were collected by the Assistant Conservator of Forests, Eastern Circle, and sent to Mabang. A considerable number of seeds from the "Nigerian" palm plot at Njala were supplied by the Division of Agriculture. All these seeds (some 800,000 in all) were sown, and by the end of the year germination was in progress, especially in the forcing frames.

22. Towards the end of the year the second 500-acre block was divided into plots and the clearing of the bush was begun.

23. At the end of December, 15 cwt. of Deli palm seed were received from Sumatra and will be sown early in 1928.

24. *Kenema Rubber Plantation.*—The tapping of the Kenema rubber plantation was continued throughout the year with satisfactory results.

25. It is hoped that in the near future this plantation will be taken over by the Prisons Department and worked by prison labour.

26. During the first half of the year one Assistant Conservator (Mr. Thomas) spent much time examining sites for orchards in connexion with a scheme for the establishment of a fruit growing and exporting industry. Mr. Thomas also visited French Guinea in this connexion and submitted a most interesting and informative report on his visit.

ERIC MACDONALD,  
*Acting Conservator of Forests.*

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## PART VI.

### REPORT ON THE DIVISION OF INSPECTION.

THE HONOURABLE THE COMMISSIONER OF LANDS AND FORESTS, FREETOWN.

SIR.

I have the honour to submit the report on the Division of Inspection for the year 1927.

2. The staff of the division consists of one European inspector, ten African sub-inspectors, and one clerk.

#### TOURS OF INSPECTION.

3. From January to April the Inspector toured in the ginger growing areas in the Central Province. During October and November he made a tour of inspection in the Northern Province, accompanied by the six newly appointed sub-inspectors who were instructed in their duties.

#### ACTIVITIES OF SUB-INSPECTORS.

4. Sub-Inspector Maddy was engaged on inspection in Freetown area throughout the year. He also made a tour of inspection on the Railway as far as Rotifunk. His duties consisted principally of the examination of produce arriving by boat from the Port Loko, Scarcies and Rokelle rivers and by rail from the Central and Northern Provinces. He obtained twenty-two convictions for offences against the Ordinance with fines amounting to £52 5s.

5. Sub-Inspector Inga was in charge of inspection in the Southern Province with headquarters at Bonthe. He carried out periodical tours of inspection at the trade centres in the Sembehun, Gbangbama, Sumbuya, Pujehun and Mano River districts. He reported twenty-four persons for offences against the Produce Ordinance, fourteen of whom were convicted, with fines amounting to £32. The other cases had not been dealt with at the end of the year.

6. Sub-Inspector Margai was responsible for the inspection of produce at Pendembu, Central Province, from January to July, when he was brought to Freetown to assist Sub-Inspector Maddy, and also to make tours of inspection in the Northern Province and Waterloo District. He obtained ten convictions for offences against the Ordinance with fines amounting to £9.

7. Sub-Inspector Jones was responsible for the inspection of produce at Blama. His duties consisted of the examination of produce offered for sale to merchants, with periodical visits to outlying trading stations. From July to the end of the year he was also responsible for inspection at Segbwema, Pendembu and Kailahun. He reported twenty-three persons for offences against the Ordinance, all of whom were convicted with fines amounting to £28. A fine of £15 was also inflicted on a Syrian trader at Mano under the Prevention of Corruption Ordinance for attempting to bribe this Sub-Inspector.

8. The following is a return showing the number of persons reported by the division and the fines imposed during the year:—

Reported	...	...	...	...	82
Convicted	...	...	...	...	69
Discharged	...	...	...	...	3
Not dealt with at end of the year	...	...	...	...	10
Total amount of fines	...	...	...	£136	5s. 0d.

#### *Produce Inspection.*

9. *Palm Kernels.*—The reports received from England on the quality of the palm kernels exported from Freetown have been most favourable and show that a good standard of quality is being maintained. The reports received on Sherbro kernels were also good, except that the percentage of oil contents in one or two shipments was not up to the standard. These shipments were undoubtedly kernels which had been stored in up river stations all through the dry season. It was hoped that it would be possible to have a sub-inspector of produce stationed at each of these buying centres on the rivers throughout the dry season, to inspect all palm kernels offered for sale to merchants, thus preventing as far as possible inferior produce, which deteriorates rapidly if stored for any length of time from being purchased. This was not possible however in 1927, owing to the shortage of trained staff. At the time of writing, however, staff is available and there is a sub-inspector stationed at Yonni and Sumbuva, the two principal buying centres.

10. The quantity of palm kernels exported from the Colony during the year has broken all previous records, 65,436 tons being exported against 65,000 in 1926, which was also a record year. The value of the kernels was considerably less, however, than in 1926, the difference being about 13s. per ton.

11. It is satisfactory to note that although the prices paid for palm kernels have been lower this year than during the two preceding years, the exports have been steadily increasing and there appears no reason to suppose that the limit of the Colony's resources in this respect has yet been reached. On the contrary there is every prospect that with the opening up of new roads further development of palm areas, hitherto practically untouched, will be the result.

12. The following figures show the total exports of palm kernels from Freetown and Sherbro for the year under review:—

FREETOWN.	SHERBRO.	TOTAL.	
Weight, Tons.	Weight, Tons.	Tons.	Value.
48,693	16,743	65,436	£1,077,450

The exports for the preceding five years were as follows:—

1922, Tons.	1923, Tons.	1924, Tons.	1925, Tons.	1926, Tons.
49,029	59,545	61,117	63,231	65,000

13. *Palm Oil.*—The inspection of this product was carried out in the Southern Province and in Freetown with favourable results. No case of adulteration was detected. It was reported, however, that the percentage of free fatty acids in some shipments from Freetown was excessive. This is due mostly to the manner in which the oil is extracted from the palm fruits. The method of extraction commonly used in the Northern and Central Provinces is by a process of fermentation known as the "Hard Oil" process and the percentage of free fatty acids in this type of oil is always higher than in oil extracted by the "Soft Oil" process. In the "soft oil" process little or no fermentation of the fruits is allowed to take place before the oil is extracted.



14. It has been proved also with oil obtained by the "hard oil" process that the percentage of free fatty acids increases during storage, owing no doubt to the presence of a certain amount of vegetable matter. This can be minimised, however, by boiling the oil, and steps have been taken to induce producers and traders to do this.

15. Propaganda in favour of the "soft oil" process was also suggested, but while this process produces the best oil the "hard oil" process gives the most oil, and the question arises as to whether the "soft oil" process could be conscientiously recommended unless the resulting advance in price would be sufficient to guard against any loss to the producers by adopting this process instead of the "hard oil" process. The matter is still under consideration.

16. The export of palm oil for the year showed an increase of 744 tons over the preceding year, 3,609 tons being exported in 1927 against 2,865 in 1926. The value of the oil was considerably less, however, than in the previous year, the difference being about £2 per ton.

17. *Ginger*.—Another effort was made during the year to improve the quantity of this product, and in that connexion the writer toured in the ginger areas and endeavoured to induce farmers to prepare a part of their crop to a Grade "A" standard. His efforts, however, met with little success, as the price offered by merchants and traders was not sufficient to compensate them for the extra time and labour required.

18. In many instances farmers did not harvest more than a third of their crop, so dissatisfied were they with the price offered and the export for the year suffered as a result.

19. The following is a statement showing the quantity and values of ginger exported during 1927 and the four preceding years:—

			Weight.	Value.
			Cwt.	£
1927	...	...	27,354	25,981
1926	...	...	55,268	72,019
1925	...	...	48,848	119,002
1924	...	...	38,847	105,633
1923	...	...	27,718	45,973

As will be seen from the foregoing, there was a very considerable drop in the quantity of ginger exported in 1927 as compared with 1926. The value also is lower than in any previous year.

20. *Piassava*.—This product showed a slight improvement in quantity and value this year as compared with 1926. The quantity, however, has not improved to any appreciable extent. It was hoped that suitable legislation would have been passed during the year, but difficulties arose as to the standard of quality to be fixed and in finding a practical method of examination. This has now been settled and it is hoped that the legislation will be passed early in 1928.

21. The total export of piassava for the year was 2,418 tons valued at £30,938, being an increase of 335 tons over 1926 with an increase in value of about £1 per ton.

22. *Weights and Measures*.—The verification and stamping of weights and measures was carried out whenever possible. During the year 224 certificates of justness were issued, while the fees collected amounted to a total sum of £22, 19s 8d. There were no offences against the Ordinance reported by the division during the year.

I have the honour to be,

SIR,

Your obedient servant,

GEO. TUACH,

*Inspector of Plants and Produce.*









